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SEPTEMBER 2020

Synapse

OFFICIAL JOURNAL OF THE **ASSOCIATION OF CHARTERED PHYSIOTHERAPISTS IN NEUROLOGY**

INSIDE

Welcome

Dear members,

This year, 2020, has been a very challenging year for all of us due to the COVID-19 pandemic. This has resulted in many changes to our plans, including cancellation of our well-planned and organised ACPIN 2020 International Conference. However, in this edition we have published all the submitted abstracts from our conference. In addition, featured in this edition are peer-reviewed articles and an editorial from a previous ACPIN president, Professor Fiona Jones.

The aim of *Synapse* – the official journal of ACPIN – is to provide its readership (nationally and internationally), including wider multi-disciplinary teams, an international, peer-reviewed platform for the publication, dissemination, knowledge exchange and discussion of recent developments and current research in the field of neurological rehabilitation.

The journal accepts original, quantitative and qualitative research reports, theoretical papers, systematic literature reviews, scoping reviews, service evaluations, quality improvement programmes, clinical case reports and technical clinical notes.

If you are interested in submitting your work for publication in *Synapse*, please follow the guidelines for manuscript preparation presented on page 55 and send your work for inclusion in the peer-review process. I look forward to receiving high quality work for publication in *Synapse*.

Dr Praveen Kumar
EDITOR

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Synapse
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Key aspects to *Synapse's* publication and dissemination strategy are :

1. To provide a platform for publication of high quality research studies.
2. To provide peer-review feedback for novice researchers.
3. To have special/ supplementary editions on specific topics/areas/student related projects.
4. To have a clearly defined editorial board.
5. To have a review board that includes both national and international reviewers. (This includes academics, researchers, clinicians, ACPIN members, non-ACPIN members/experts in the field of neurology/neurological rehabilitation, physical medicine and rehabilitation).

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Sharing stories… an editorial during a global pandemic

Professor Fiona Jones
Professor of Rehabilitation Research, St George's University of London and Kingston University, founder and CEO of 'Bridges self-management' and a past President of ACPIN

There was a night around the third week of March in which everything changed. It was 1.00am and I had been asleep for no more than an hour. I woke, heart racing and realised that life was going to be different – not just a bit – but radically different. This was a few days before the UK went into full lockdown for the first time in living history. I had some idea of what it would feel like from my daughter who lives in France and was a week ahead of us – her words were "you've got this Mum" … I wasn't so sure!

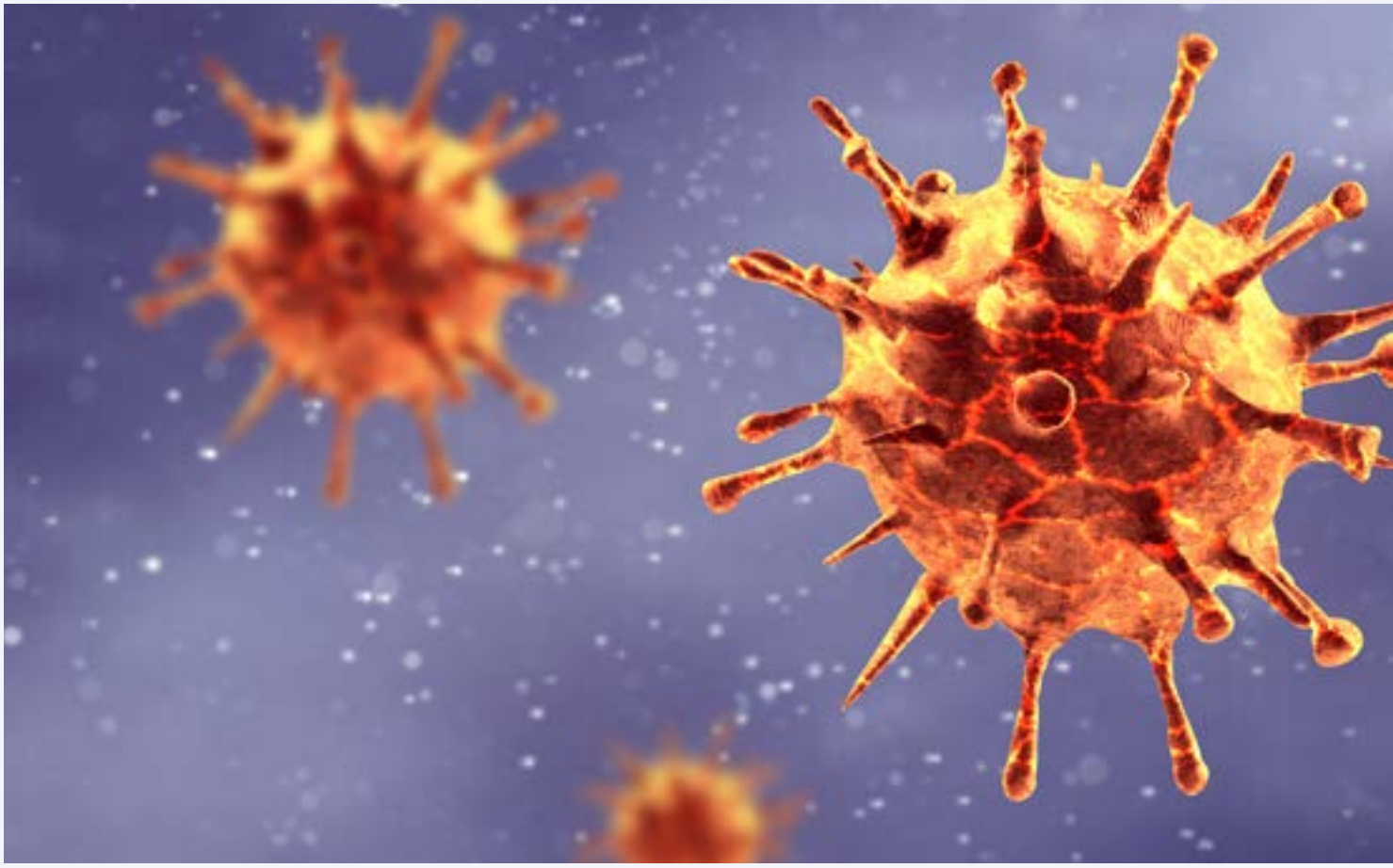
Services moved to remote ways of working and we saw pixilated faces instead of connecting in person.

As we all faced change and uncertainties, now add in the experience of managing life in lockdown with a stroke, brain injury or long-term neurological condition. For most their rehabilitation stopped – whilst the NHS struggled to cope. Services moved to remote ways of working and we saw pixilated faces instead of connecting in person. Patients and families were having to quickly adjust. Some felt they were no longer worthy of attention compared to dealing with threats to life, whilst some felt abandoned and lost. Speaking to Mark who was one-year post stroke, he told me he just couldn't contemplate how he would cope. The thought of managing alone without the regular face-to-face support of the therapists that had become part of his life was unimaginable.

We know the strong link between sense of self and wellbeing. Disruptions in sense of self lead to feelings of powerlessness and in some cases hopelessness. During the early stages of the pandemic all normal anchors were lifted and moved. The impact of uncertainty, fear and anxiety is heightened for someone in hospital. And for those who end up in ITU they are more susceptible to something called Post-Intensive Care syndrome (PICs) which is long-lasting and can impact across all biopsychosocial domains. But for everyone, whether recovering from stroke, or after COVID-19, familiarity and normal social connections help. Being with family and friends and doing things you enjoy are the best drug or treatment. But with this pandemic everything had shifted.

Cautiously, and with lots of caveats, I began to draw parallels between what we have all experienced during the first few weeks of the pandemic and what it might feel like for a person waking up in a stroke unit, ITU or receiving a diagnosis of MS. The link seems to be how 'in or out of control' we feel. Normal is now a different normal and none of us knew what it would look like in the end. Like many of my colleagues I went at this pandemic too hard and too soon, thinking I could work my way out of the crisis. But we all started realising we had peaked too soon (pardon the pun) – and our approach needed to be a marathon not a sprint. This idea that more is better, and we all have to work harder, is the parallel here. We know that the evidence says intensity is important, but it's what you do and how you do it that can have the greatest impact. And especially if we don't acknowledge and celebrate what we have already achieved. I heard of clinical teams and individual practitioners feeling out of control and losing their identity, eventually needing to regroup and focus on everyday tasks, small things that reinforced their feelings of accomplishment and a sense of control. One community rehabilitation team lead told us she applied Maslow's hierarchy of need to explore what was important with her team. After all, if you don't feel safe, or if you worry about getting food, you can't think about more complex issues at work.

In different degrees as the weeks passed by, we all started the process of shifting and transitioning. And no different to many people living with health conditions we tried to figure this collectively and individually. For me I finally adjusted to the idea that I wasn't going anywhere – no workshops, no research meetings, no travel. But the upside was I was connecting more frequently and more effectively with the people that shared my interests. And the big bonus was that many of the unnecessary meetings no longer took place, and less travel time meant doing other things – like connecting (virtually) with friends and



families. And I developed a Downton Abbey habit – which I found was the perfect antidote to 5.00pm daily briefings. And my house plants were looking healthy for the first time ever!

Reflecting on what works is so underemphasised in our culture and healthcare systems; we tend to focus on problems and try to solve them by making changes. But here is the opportunity for all of us, including patients we work with, to celebrate successes and our ways of coping. Working out how to connect remotely with patients and stay person-centred is one real success. And we heard of teams reflecting on their services and using the opportunity to do things differently not just now but in the future. We also sensed that clinicians were keen to explore different ways to connect with each other and access new learning opportunities. We took our first tentative steps into webinar land – and have been blown away by the support and interest we have received. The *zeitgeist* was about searching for meaning in this time of disruption and uncertainty, sharing experiences and supporting each other. The ideas for each webinar emerged from the one before – and were generated by and for the rehabilitation community to address their gaps and needs.

I think back to chats I have had with people living with stroke and brain injury – some have told me how they have drawn on their past experiences to manage life in lockdown, drawing on resources they have already used to help with their recovery or manage life with a long-term condition. Like a stage of grief in the Kubler-Ross model, we need to reach out to others, tell a story and find meaning. What helps is space and time to exchange ideas and build on successes. Peer support is another active ingredient that is often overlooked. But we gain inspiration from hearing stories. The best TED talks are those that include a personal narrative. And the stories of this pandemic should continue to be shared. We could learn a lot from patients that have self-managed in self-isolation but also from each other.

Reflecting on what works is so underemphasised in our culture and healthcare systems; we tend to focus on problems and try to solve them by making changes.

A biomechanical approach to gait re-education following stroke

A clinical discussion paper

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The aim of this paper is to highlight the importance of biomechanical alignment on gait re-education following stroke and how this could be introduced clinically.

Normalising the demands of gravity across our joints may result in a more normal response from our neuro-muscular system.

The main function of our lower limbs is to keep us upright and propel us against gravity. Gait is a complex balancing act wherein we learn to move in an efficient and effective manner. Whilst we will all have our individual characteristics, most of us walk in a similar way using similar muscle groups with similar timings to propel ourselves in similar ways. Stroke and other neurological insults disrupt the control we need to perform this fine balancing act. This paper suggests that the action of gait, both its mechanics and neurophysiological control, is in response to the constant destabilising force we all experience: gravity. The way in which gravity causes moments about our joints will require muscle action to maintain stability. It is proposed that by realigning our joints to recreate the demands in normal gait, we are more likely to get a more normal response following disruption. A common goal for those involved in gait rehabilitation is restoration of normal movement by motor learning; for a system be to learnt, it needs appropriate demands to give the appropriate response.

Normalising the demands of gravity across our joints may result in a more normal response from our neuro-muscular system.

For those not familiar with Ground Reaction Force Vector (GRFV), it is the force response from the ground to oppose the force applied to it. Gravity acts on the body to give it weight which can be represented with a line from the centre of gravity to the floor; the length of the line can represent the magnitude. If the knees are flexed, we can see how this ground reaction force vector generates a moment at the knees, hips and ankle which can be calculated by the magnitude of the vector multiplied by the distance from the joint axis (*Figure 1*). In order for us not to collapse into flexion, we need to generate a muscular response to that force – this will be hip extensors, knee extensors and ankle plantar flexors. That is why we call these muscle groups our anti-gravity muscles. This is obviously a lot more complex in gait but electromyography studies and GRFV studies in gait labs have made this very accessible to us. We can see from *Figure 2* how in normal gait the ground reaction force vector changes relative to the joint centres placing different demands on the neuromuscular system. This is further complicated by whether the neuromuscular response may need to stabilise, accelerate or dampen the effect of gravity depending on the stage of the gait cycle.

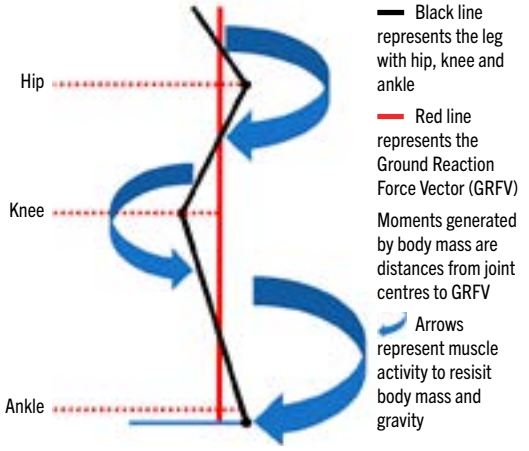
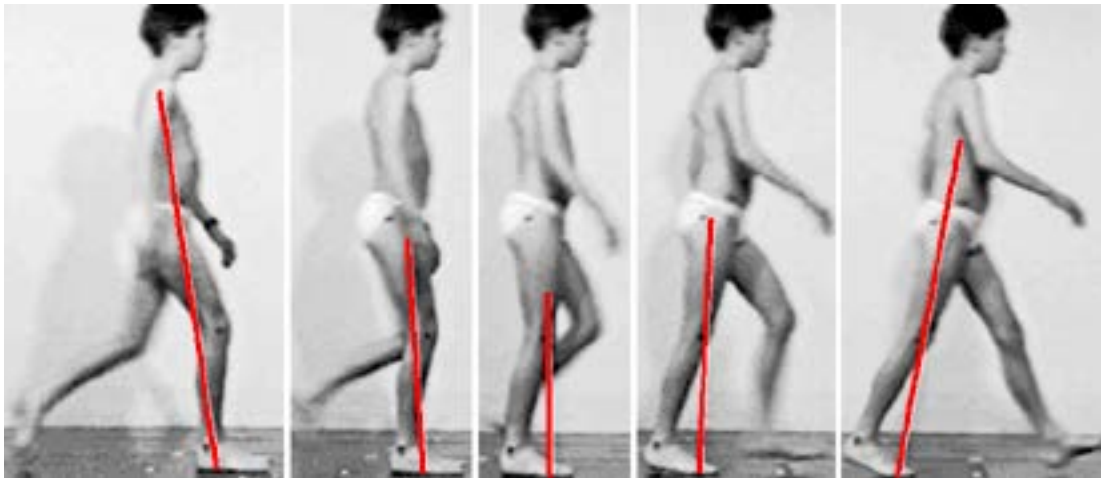


Figure 1 Ground reaction force superimposed on lower limb

Normal gait

Normal muscle patterns for the major muscles are well documented by many authors (Winter DA 2009, Perry JMB 2010). It is assumed that physiotherapists are well versed in these patterns and resultant graphs. In biomechanics and gait analysis, ground reaction force patterns have also been studied and there are well recognised and documented patterns



Stroke and other neurological insults may disrupt the neuromuscular control required for normal gait.

Figure 2 Normal GRFV through the gait cycle. Note: the tibia is always inclined forward over the foot following initial contact.

showing how ground reaction force vectors change during normal gait causing flexion and extension moments across the joints of the lower limb. (Perry JMB 2010)(*Figure 3*).

There has to be correlation between the moment generated by the ground reaction force vector and the muscle activity in order to maintain stability and propulsion. (Perry JMB 2010) (*Figure 3*). The term torque and moment are interchangeable terms between engineers, biomechanists and different countries and professions.

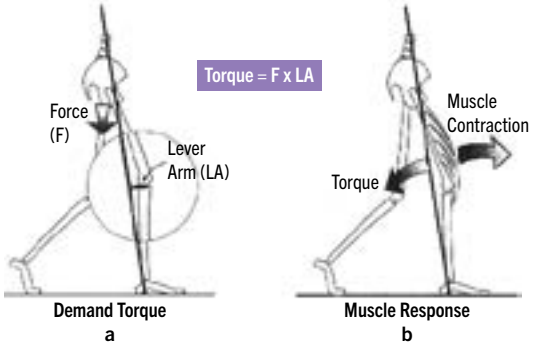


Figure 3 Mechanical demand and muscular response (Perry 2010). Reprinted with permission from SLACK Incorporated.

Pathological gait

Stroke and other neurological insults may disrupt the neuromuscular control required for normal gait. A simple way of reducing the demands on the neuromuscular system is by changing our alignment. The way we as humans are engineered, hips and knees do not usually bend backwards (hyperextend) due to the arrangement of our ligaments and other structures. These structures do not require neuro-muscular control therefore changing alignment so that the demands of gravity are extending the knee and hip negates the need to use muscle action (*Figure 4*). *Figure 5* shows how fixing the ankle at an appropriate angle can realign the tibia and alter knee and hip alignment relative to the ground reaction force vector.

Figure 4
Typical altered gait pattern – ankle plantar-flexed and knee hyperextension, requires minimal input from neuro-muscular system. The AFO is a swing phase device to help foot-drop and is insufficiently rigid to control tibia in stance.

Figure 5
Corrected alignment with rigid AFO, Knee over foot with tibia inclined forward, flexion moments at knee and hip requiring activation of hip and knee extensors to gain stability.

Many patients use this technique to develop a gait pattern which many of us will be familiar with: knee hyperextension, extended hip in standing, or the other option at the hip is to use an external support such as a stick with the hip in flexion while they take a very quick step with the good leg before they collapse into further

Figure 6 Plantar-flexing the ankle with the foot on the ground extends the knee and causes the hip to extend to maintain balance, negating the need to use knee or hip extensors.

One of the great challenges is determining what the potential is and why patients adopt the presentation they do.

hip flexion. To attain a hyperextended knee in stance, the ankle has to plantar-flex (*Figure 6*).

The altered alignment by the patient is a strategy to attain stability where normal stability cannot be attained due to the underlying impairment. If left to their own devices, this pathological pattern can very quickly become established, even if there is some recovery of the neuro-muscular system. It may be that there is no recovery and these compensations are the only way they can function. As time goes on in this gait pattern there is a danger that ligaments stretch resulting in deformity, pain and ankle plantarflexion becoming established and contracted. Without intervention, patients may not progress or be able to use any recovery that may occur.

A proposal for change

Current treatment in gait rehabilitation is extremely varied (Pollock *et al* 2014). Repeated practice, treadmill and partial weight-bearing systems are frequently quoted along with facilitation by physiotherapists, whilst alignment relative to gravity is rarely mentioned. Practice and all of these techniques without normal alignment may not be putting appropriate demands on the system. Alignment can be changed by therapists and therapy assistants but this is unlikely to be consistent across all joints during gait or for long enough to induce change given treatment time available. Practice and facilitation in normal alignment will place repeatable, consistent demands on the system, important components for motor learning. The proposed change in practice is to provide a device that will place the patient in optimal alignment to have to recruit more normal activity in the absence of therapists. This will make standing or walking using altered alignment impossible to do. It will also maintain the foot and ankle in an optimum position to preserve range and prevent contracture. We will go on to see how this is practical and easy to implement and in doing so, changing the biomechanical demands to get the most appropriate neuro-muscular response.

A clinical test

Not all patients have the potential to improve, depending on the nature of neurological damage. One of the great challenges is determining what the potential is and why patients adopt the presentation they do. As a practising orthotist in the UK, I have developed a quick simple clinical test to explore the causes and effect of alignment changes in hemiplegia.

The test specifically considers stance phase of gait, requiring the therapist (orthotist or physiotherapist) to manually change alignment while the patient steps over the hemiparetic side whilst supported by an assistant on the non-hemiparetic side.

The key causes of knee hyperextension in hemiplegic gait

Biomechanical perspective

- **Equinus ankle** (tight calf/spasticity) (Whittle *et al* 2012)
  If the ankle has limited range into dorsiflexion, the only way to get the heel to the ground is to drive the tibia backwards or compensate with a heel raise.
- **Poor control of tibia over foot**
  If there is poor co-ordination of muscle activity between dorsiflexors and plantarflexors, to stabilise the tibia over the foot as in normal gait, the patient may lock into knee hyperextension to gain that stability.
- **Underactive quadriceps** (Whittle *et al* 2012)
  If there is poor control of quadriceps then the knee may collapse into flexion. Overextending the knee creates an extension moment providing that stability.
- **Overactive quadriceps**
  Increased tone in quadriceps will drive the knee into hyperextension.
- **Underactive hamstrings**
  The resultant muscle imbalance of the quadriceps having a poor antagonist may result in knee hyperextension.
- **Underactive hip extensors**
  In the absence of hip extensor control, if there is a hip flexion moment at the hip, the patient will be unable to stabilise; they will need to alter alignment to a hip extensor

moment which requires hip extension. To attain this in stance, the knee has to hyperextend.

Non-biomechanical cause

- **Proprioception/awareness**

Testing method

A simple method of placing hands on a patient when standing and stepping informs the clinician of the underlying causes of the presentation. This will inform both orthotic design and potentially physiotherapy intervention in addressing the underlying cause.

To begin, a baseline test is performed simply by asking the patient to try and step forward and backwards with the non-affected limb; this makes them load the hemiplegic limb so alignment and control can be observed. (*Figure 7*). The test involves the following:

- Patient standing whilst the therapist sits on a low stool on the side of the hemiparesis. The patient is supported on the non-hemiparetic side by an assistant.
- Ensure the heel is in contact with the ground using heel raises if required.
- Place a hand behind, just below the patella, to stabilise the knee should it collapse into flexion.
- Use a hand or the therapist's knee to push the patient's knee into slight flexion so the tibia is inclined forward and the patient's knee is slightly flexed such that the knee is over the foot in preparation for a step. (*Figure 8*).
- Have the patient step forward and backwards with the non-hemiparetic leg, meaning the hemiparetic side is performing stance phase of gait.

Figure 7
Baseline observation.

Figure 8
Holding the affected side in alignment.

Testing results

The results are a consequence of what the therapist sees and feels when performing the test. This test is for consideration of the impact of alignment and recruitment in the sagittal plane and the main reasons for changes. By taking a full step with the non-affected side, the effect of weight-bearing throughout the stance phase can be observed. The possible causes referred to are the most common ones; however, there may be others which should be investigated.

Observation	Possible cause	Possible intervention
Heel rise	Lack of calf range/calf spasticity	Stretch calf/ manage spasticity/ retain firmly with Orthosis or cast
Large force required by hand at front of knee	Underactive quadriceps	Work on quadriceps control or apply force from orthosis or cast
Large force required at back of knee	Overactive quadriceps/ spasticity	Work on quadriceps control/manage spasticity/ apply force with orthosis or cast
Force required at back of knee	Underactive hamstrings	Work on hamstring control/apply force with orthosis or cast
Minimal force required	Lack of awareness of position but able to recruit appropriately	Work on prompting and awareness before considering external device
Collapse into hip flexion	Underactive hip extensors	Work on hip extension, consider use of cast or orthosis as therapy tool to provide distal alignment whilst working on hip extension

Table 1 Observations with potential causes and interventions for clinical test.

Alignment can be changed and managed by fixing the tibia over the foot; this is common practice in orthotics and is well documented and researched along with the effects proximally (Carse B, Bowers R, Meadows B and Rowe P 2015) and illustrated in *Figure 6*. There is in some physiotherapy units a reluctance to fix an ankle; undoubtedly, this will inhibit any action and practice at the ankle. However this should be considered as part of a therapy regime and need not be used all of the time. The AFO (*Figure 9*) or cast (*Figure10*) is easily removed for ankle mobilisation and supervised work; however, this should not be to the detriment of proximal alignment as knee, hip and trunk alignment may be compromised if the ankle is unstable. There is a big difference in having sufficient control of the foot and ankle in swing phase to controlling the tibia over foot in stance.

This test simulates orthotic intervention. The tester's hands can be replaced mechanically using a cast (*Figure10*) or an orthosis to replicate the forces applied by the hands. The device must be sufficiently rigid to control the forces placed upon it. Unfortunately most 'off the shelf' devices are not sufficiently rigid to do this.

Figure 9
Rigid polypropylene AFO.

Figure 109
Below knee removable cast.

No matter how clever science gets at fixing the brain and a damaged central nervous system, it is essentially a control system and will only respond to the demands placed upon it; appropriate demands are essential for normal learning.

Proposed treatment plan

- Perform hemiplegia stepping test on patient, identify and record outcome.
- If able to maintain stability in corrected alignment, walk as much as possible with supervision as needed for safety. Repeated walking in good alignment will place appropriate demands on the system to reinforce appropriate response from the neuro-muscular system. The aim is to move any need for cognitive input from the patient to automatic, spinal activity at central pattern generators.
- If hands are required to apply corrective forces to maintain that alignment, then apply a cast/orthosis to do so. The magnitude and direction of those forces will influence design and stiffness required. A rigid cast or rigid ankle foot orthosis (AFO) will maintain ankle position, prevent hyperextension and block knee flexion and can be tuned to optimise alignment. Tuning is optimising the heel height once the ankle is rigid to optimise GRFV alignment and can be done on footwear or cast sandals. (Carse *et al* 2015).
- If a patient struggles with ankle dorsiflexion recruitment but has good stance phase control then a simple swing phase flexible orthosis may be appropriate, similarly with challenges into inversion or eversion.
- Walk as much as possible in that induced alignment in order to place consistent, repeated appropriate demands on the neuro-muscular system in order to elicit appropriate motor learning.
- If unable to maintain stability in corrected alignment, use as a treatment tool in therapy to isolate distal joints where control is lacking so that facilitation and therapy intervention can be targeted proximally ie facilitate hip/knee extension during therapy in best alignment.
- Consider delaying walking with inappropriate alignment and limit to therapeutic walking. This can be enforced by applying an orthosis or cast which will make standing impossible without facilitation or proper recruitment (Pomeroy *et al* 2012).
- At some stage, if recovery seems unlikely then consider a compromise, either accepting compensations or compromising alignment to limit joint damage.
- Create a programme of supervised activity with and without the AFO to work on ankle control if there is recovery.
- Regularly repeat hemi test to evaluate progress and adapt treatment including orthosis use and design accordingly.

Common challenges to this approach

Having a fixed ankle is not normal, in hemiplegia; however, where there is lack of control at multiple joints, there are too many degrees of freedom for the patient to try and control at the same time. Reducing those degrees of freedom allows targeted training in optimal alignment (Butler P, Major R 1992). There is also a high risk of muscle imbalance and subsequent contracture. With or without an orthosis, it is important that a stretching regime is in place to negate that risk. It would be difficult for hands to provide reliable consistent stability when walking whilst a fixed external device can. The device can also reinforce that realignment when the therapist or assistant is not present ensuring each time when weight bearing, stepping or walking, motor learning is reinforced.

Whilst a rigid ankle is not normal, for 75% of stance phase there is less than 7° ankle movement. First rocker (heel strike to foot flat) and second rocker (tibia moving over foot) may be accelerated but for the majority of stance we fix our tibia over our foot while our knee extends bringing our trunk forward. This is well illustrated by the works of Perry (Perry JMB 2010) and Winter (Winter DA 2009) and can be seen in *Figures 11* and *12* below:

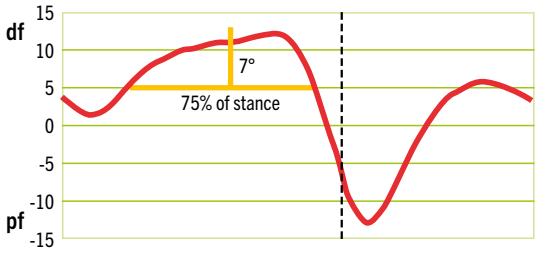


Figure 11 Sagittal plane ankle angle during gait, toe-off is at dotted line (adapted from Perry JMB 2010) Reprinted with permission from SLACK Incorporated.

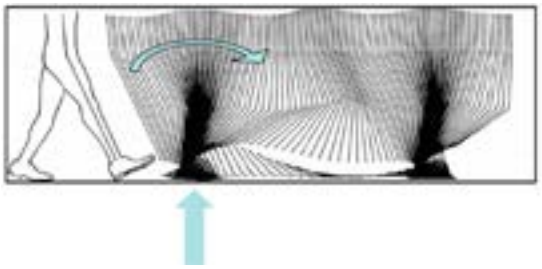


Figure 12 Limb segment progression through stance phase of normal gait (Winter DA 2009).

Practical considerations

More dorsiflexion is required at the ankle to get from sit to stand. This can be provided by having a block at the chair to go under the heel which will give greater tibia inclination for standing and can then be walked off to allow optimal alignment for gait.

A rigid AFO can have the top calf strap undone which would then allow free dorsiflexion at the ankle. This could be to allow a specific task or to allow greater movement to further challenge the patient as part of treatment. Be aware: free dorsiflexion may allow premature knee flexion in stance therefore reducing the stretch on the gastrocnemius.

Changing the heel height or walking on slopes will alter tibia alignment relative to the ground reaction force.

An orthosis doesn't need to be worn all of the time. Some patients improve considerably and can hold alignment when concentrating but may need help when fatigued or on difficult terrain.

Additional benefits and consideration

Fixing the ankle in optimal alignment automatically maintains that position in swing phase ensuring clearance and control.

In stance, both the therapist and patient are struggling to control trunk, hip and knee, over a foot and ankle that may have limited control. As well as optimising alignment, fixing the ankle allows more targeted training proximally over that more stable base such that learning may be graduated stand. The importance and relevance of this were investigated and described by Major and Butler (1992).

Range is maintained in the calf, reducing risk of contracture.

Conclusion

No matter how clever science gets at fixing the brain and a damaged central nervous system, it is essentially a control system and will only respond to the demands placed upon it; appropriate demands are essential for normal learning. It is proposed this simple technique of applying an external device, cast or orthosis acts as a practical starting point and guides intervention in gait rehabilitation following stroke. It could be argued that not aligning the patient and placing appropriate demands on the system denies the patient the opportunity to learn and recover to their potential.

Dr Roy Bowers of Strathclyde in Glasgow did some excellent work in advocating consideration of use of AFOs following stroke in his best practice statement for NHS Scotland in which he advocated assessment and consideration of AFO. (Bowers 2009). This paper provides a clear means of assessment as to when to implement that practice and proposes the overall impact it has on treatment. This paper suggests that biomechanical alignment is essential for motor learning and provides a means to assess and provide that treatment.

It is hoped this paper raises the need to routinely assess alignment in weight bearing and, where lacking, induce appropriate alignment by either a cast or AFO and the teaching of these important practical principles are introduced at undergraduate level.

Competing interests and sources of funding

The author has no conflict of interests to declare and no funding was sought or paid in the preparation of this article.

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Aerobic exercise training to improve cardiorespiratory fitness after stroke

A service evaluation at a Level 1A Inpatient Rehabilitation Service

Emma Dodds MSc[1], **Eleanor Douglas** MSc[2]

Stroke is the fourth major cause of death in the UK, but the most prevalent cause of disability, with more than 100,000 episodes of stroke every year (Stroke Association 2018). Reduced cardiorespiratory fitness (CRF) is a common consequence of stroke, caused by neurological impairments, co-morbidities, inactivity during rehabilitation, and the psychological impact on mood and anxiety (Bernhardt *et a*l 2007, Mackay-Lyons and Makrides 2002).

An estimated 77% of stroke survivors are sedentary; compared to gender- and age-matched healthy individuals, their CRF is between 26-87% of normal levels (Marsden *et al* 2013). Reduced CRF creates a vicious cycle of increased tiredness and difficulty completing daily activities, resulting in loss of independence (Smith, Saunders and Mead 2012). In the UK, this carries an economic burden since a third of all strokes occur in people aged 20-64, which can reduce employment prospects and productivity for society (Stroke Association 2018). Furthermore, there is evidence-based agreement that a sedentary lifestyle and reduced CRF are risk factors that precipitate an increased incidence of stroke recurrence, cardiovascular disease, diabetes and mortality (Smith, Saunders and Mead 2012).

There is broad consensus that aerobic training improves CRF and walking capacity, and can be performed safely across the spectrum of stroke severity (English, Hillier and Lynch 2017, Marsden *et al* 2013, Saunders *et al* 2016). The role of aerobic exercise to improve fitness is recognised in the *National Clinical Guidelines for Stroke*, for ambulatory and non-ambulatory stroke survivors (RCP 2016). Evidence for the optimum type and dose of exercise after stroke has yet to be established. Physiotherapists need to use clinical guidelines, in conjunction with clinical expertise, to prescribe individualised exercise programmes.

Provision of an exercise programme alone will not evoke a long-term change in patients' behaviour or increase physical activity levels. Exploring an individual's preferred mode of exercise and influence of peer support in a group may improve adherence to exercise (Ammann *et al* 2014). Accumulating evidence points to physical activity beliefs, self-efficacy, exercise preference and social support systems as important determinants of exercise behaviour which influence participation (Banks *et al* 2012, Morris *et al* 2012, Nicholson *et al* 2013). In clinical practice, stroke rehabilitation primarily focuses on restoring function and independence in activities of daily living to facilitate discharge. Physical activity levels do not meet stroke guidelines in the subacute phase of rehabilitation, CRF is often not addressed and sedentary time is >78%, regardless of time post stroke (Fini *et al* 2017). This evaluation was performed in a tertiary specialised Level 1a rehabilitation service. It is funded by NHS England to provide specialist neurorehabilitation for adults with highly complex needs following injury or illness. Physiotherapists provide individualised aerobic exercise programmes within the first two weeks of admission, to be carried out in addition to their usual rehabilitation. There are no standards related to frequency, duration or intensity of exercise. A service evaluation of the effectiveness of aerobic exercise with adults post stroke has not been conducted before.

Aims

- To evaluate the effectiveness of an aerobic exercise programme on patient outcomes after stroke.
- To evaluate the exercise programme from patient perspective.

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Methods

Design

A service evaluation design using a convenience sample. The service's NHS Trust Research and Development Department approved the project as a service evaluation and ethics was not required. All data collected was anonymised.

The rehabilitation unit had 18 inpatients, with an average of five admissions and discharges per month. The majority of patients were discharged home, but some transferred to residential care, or returned to the referring hospital for discharge planning. Six WTE physiotherapists treated inpatients, 3.0 Band 7s, 2.0 Band 6s and 1.0 Band 5, with 1.0 physiotherapy assistant and 0.9 rehabilitation assistants.

Patients

A convenience sample of ten inpatients post stroke between December 2017 and June 2018. Patients were admitted in the subacute (< 6 months post-stroke) phase of recovery, and remained an inpatient for 12 to16 weeks. A consultant in neurological rehabilitation established if patients had any absolute contraindications to exercise (ACSM 2017). Inclusion criteria were ambulant and non-ambulant patients, with an ability to use exercise equipment in the physiotherapy gym and on the ward, with or without assistance from physiotherapy staff. Exclusion criteria were severe physical, cognitive or communication impairments that would preclude participation in exercise, or raise concerns for patient or staff safety. Patients were assessed on admission by a physiotherapist and provided with an individualised exercise programme.

Materials

There was no change to usual treatment for the patients involved. The programmes were based on ACSM guidelines for cardiorespiratory fitness, that aerobic exercise should be performed on three to five days per week, 20 to 60 minutes per session at a moderate intensity, 11–14 Borg Rating of Perceived Exertion (RPE) scale 6–20 (ACSM 2017). Aerobic exercise programmes included static arm or leg bikes (wheelchair-accessible MOTOmed bike, recumbent bike or upright bike), treadmill walking, spinning and lower limb circuits.

Patients exercised in a supervised group and/or individually with an assistant, up to six days per week. Circuit training and spinning were each run once a week. Spinning was 20 minutes duration, two-minute warm up and cool down, one-minute intervals fast >60 rpm then slow < 30 rpm, increasing the resistance on the bikes as tolerated. Lower limb circuits was 45 minutes duration, five-minute warm up and cool down in standing, ten stations of balance and lower limb strength exercises. two minutes on, one minute rest. Groups sessions lasted 45 minutes, staffed by one physiotherapist and one assistant for six patients. They exercised aerobically for up to 30 minutes per session, in multiple ten-minute intervals depending on ability. Patients rated their perceived exertion after exercise, using the Borg RPE scale. Completion of exercises was recorded as per routine documentation standards.

Procedures

Standardised test procedures were followed and data was collected on admission (or when the patient was able to walk), and on discharge, by the patient's physiotherapist. The investigator trained the physiotherapists administering the standardised outcome measures, to ensure consistency.

Primary outcome measures

The six-minute walk test (6MWT) measures cardiorespiratory fitness by recording the distance walked in six minutes, conducted over a 30 metre course. The ten-metre walk test (10MWT) measures walking speed by recording the time taken to walk ten metres at a self-selected pace. Usual ambulatory devices, lower-extremity orthotics, and stand-by assistance were permitted. These measures are feasible to administer in clinical practice, since they are inexpensive and only require a stop watch (ATS 2002, SRALab 2018).

Secondary outcome measure

The Berg Balance Scale (BBS) is a 14-item objective measure of balance impairment (Berg *et al* 1995).

Patients' exercise preferences

Questionnaires studying exercise preference in older adults, and cardiac rehabilitation, were considered but did not sufficiently capture the challenges affiliated with stroke (Cohen-Mansfield *et al* 2004, Ruland and Moore 2001). A bespoke questionnaire was designed in consultation with an expert clinician. A five-point Likert scale was used to capture exercise habits pre and post stroke, motivators and barriers to exercise and satisfaction with the exercise programme delivery (see *Appendix*). Patients were provided with the questionnaire in a blank envelope. Participation was voluntary and anonymous. Consent was assumed if the questionnaire was completed and returned.

Data analysis

Descriptive data are presented as mean ± standard deviation (SD) to summarise patient demographics, primary and secondary outcomes. Paired t-tests were used to evaluate change in primary and secondary outcomes

In clinical practice, stroke rehabilitation primarily focuses on restoring function and independence in activities of daily living to facilitate discharge.

between baseline and post intervention. Statistical analyses were carried out using the IBM Statistical Package for Social Sciences for Windows with a significance level set at $P < 0.05$.

Results

Ten patients (six female, four male, mean age 41.2 ± 11.3 years) met the eligibility criteria for inclusion in the service evaluation (*Table 1*). This represented 48% patients post stroke admitted for rehabilitation during the seven-month period of data collection.

Primary outcomes

- **Cardiorespiratory fitness** A significant beneficial effect of aerobic exercise on CRF was found in nine patients (data missing for one patient) (SMD=61.3; 95%CI 28.7 to 93.9; p=0.02) (*Table 1*). The 6MWT improved by 55.2 ± 42.2 metres. Eight (88%) of these scores met the minimal clinically important difference (MCID) of 34.4m for stroke (Tang, Eng and Rand 2012).
- **Walking speed** A significant beneficial effect of aerobic exercise on walking speed was found in nine patients (data missing for one patient) (SMD=0.39m/s; 95%CI 0.70 to 0.09; p=0.018) (*Table 1*). The 10MWT scores improved by 0.36 ± 0.39 metres/second (m/s). Seven (77%) of these scores met the MCID of 0.16m/s for stroke (Tilson 2010).

Secondary outcome

- **Balance** A significant beneficial effect of aerobic exercise on balance was found in eight patients (SMD=20.13 points; 95%CI 10.3 to 29.9; p=0.02). The BBS scores improved by 19.9 ± 11.7 points. Seven (88%) of these scores met the MCID of 6 points for stroke (Saso *et al* 2016).

Characteristics	Group Baseline (n=10)	Post Intervention (n=10)	95% CI (MD)	P
Age (years)	41 ± 11.3 (22-53)			
Male (%)	4 (40%)			
Time since stroke (days)	40.1 ± 15.5			
Length of stay (days)	123.4 ± 30.2			
6MWT (metres)	174 ± 187	229 ± 172	29 – 94	0.020
10MWT (metres/sec)	0.20 ± 0.23	0.59 ± 0.47	0.70 – 0.09	0.018
BBS (points/56)	18.3 ± 22.9	43 ± 11.1	10.3 – 29.9	0.020

Abbreviations
Values are mean ± SD.
6MWT: 6 minute walk test
10MWT: 10 metre walk test
BBS: Berg Balance Scale
CI: confidence interval
MD: Mean Deviation
P: p-value significance level P<0.05

Table 1 Characteristics, Primary and Secondary outcomes at baseline and post intervention

Exercise performance

Cycling was the most frequent mode of aerobic exercise; ten patients used leg bikes and three also used arm bikes. In addition, seven patients did treadmill walking, five did spinning class and four did lower limb circuits. Exercise was performed at a self-reported moderate level of intensity (mean RPE Borg 13.5 ± 1.18) for 20 minutes per session (mean 20.02 ± 5.02). There were no adverse events.

Questionnaire

Eight patients completed the questionnaire. One patient was discharged and did not return the questionnaire; another was unable to complete it due to cognitive and communication impairments. Six patients exercised regularly pre stroke, three to four days per week for up to 45 minutes per session, either walking outdoors or exercising at a gym. All patients agreed, or strongly agreed, that exercise would help them feel stronger and improve balance, walking, independence and mood. All patients were satisfied with the equipment, timing and frequency of group sessions. One patient reported group sessions were too short and two reported their exercise programme was not challenging enough. Seven patients recognised having support from a physiotherapist was motivational and instilled more confidence to exercise. Two patients cited fatigue and pain as barriers to exercise, and one had a fear of falling. All patients enjoyed exercising in a group.

Responses to the open-ended question were informative:

- **Patient 3** 'Once out of hospital it is important for me to have professional support in the gym'.
- **Patient 5** 'The physiotherapy exercise has been a critical part of my recovery and very motivating'.
- **Patient 6** 'The exercises are good and the equipment is fine; I will get myself healthy when I leave here'.
- **Patient 10** 'I have found the physiotherapists amazing. I am grateful for giving me an exercise programme to do at the weekends. I would like to know what my options are for exercise once I leave here'.

Discussion

This service evaluation found improvements in CRF, walking speed and balance in patients who received an individualised aerobic exercise programme during inpatient rehabilitation. The findings concur with a Cochrane review of physical fitness training for stroke survivors, that found cardiorespiratory training, in addition to usual stroke care, is effective in increasing walking speed and walking capacity

(Saunders *et al* 2016). Cycling was observed to be the most feasible way for all patients to exercise; it allowed the therapy staff to supervise a number of patients at one time in a group setting. Interestingly, three patients who only exercised using static arm or leg bikes still showed significant improvements in their walking speed. Cycling on a wheelchair-accessible MOTOmed bike or recumbent bike demands less postural control compared with treadmill walking, and is a practicable substitute for newly ambulatory patients and those with impaired balance (Kim *et al* 2015, Shen *et al* 2018). Treadmill walking has been shown to be challenging for newly ambulant patients to walk for a sufficient duration and intensity to gain cardiorespiratory benefits, due to neurological impairments (Polese *et al* 2014). There were no adverse events eg injuries that prevented further exercise, or medical intervention needed to stabilise patients eg cardiac arrhythmias or unstable BP. Exercise appears to be feasible and safe, and can confidently be included in inpatient rehabilitation (Saunders *et al* 2016).

Patients attended 79% planned exercise sessions, but intensity and duration of training recommended for stroke were not always achieved (Billinger *et al* 2014). Two patients, who exercised for 45 minutes four times per week pre stroke, reported their exercise programmes were not challenging enough. This implied the physiotherapists did not prescribe adequate exercise at an adequate dose, likely due to a lack of knowledge or understanding of exercise training principles. It is challenging for physiotherapists to prescribe an optimal evidence-based exercise programme for individual patients because of inconsistent and incomplete reporting of the prescription of, and adherence to, exercise programmes in research (Ammann *et al* 2014, Lal and Korner-Bitensky 2013). Furthermore, there is little guidance on how to improve existing, or develop new, exercise services after stroke. There are no explicit standards for delivering exercise training after stroke (RCP 2016, SIGN 2010). Exercise was identified as a valuable yet underused component of physiotherapy treatment at this inpatient rehabilitation service. In pursuit of continual quality improvement, service evaluation provided an opportunity to comprehensively investigate this issue to improve patient outcomes and make recommendations for future service delivery.

Questionnaire data identified themes relevant to understanding exercise participation after stroke among this young group of working-age adults, mean age 41 years. Their exercise preferences had changed since their stroke; patients showed a greater preference for supervised group exercise where they felt safer, more motivated, could ask for guidance and build their confidence. The exercise sessions were staffed by one qualified physiotherapist and one assistant to utilise resources effectively, without additional funds, staff or clinical time. This service evaluation found that delivering group exercise was effective on clinical outcomes and met patients' satisfaction. Research has shown that groups provide opportunities for vicarious learning and to compare performance with others, which may be instrumental in rebuilding self-efficacy (Ammann *et al* 2014, Carin-Levy *et al* 2009). The influence of peer support improves adherence to regular exercise and keeps patients motivated (Choi *et al* 2017, Morris *et al* 2012). Group circuit training has been shown to be effectual in improving functional outcomes after stroke, and is cost-effective compared to individual sessions (English, Hillier and Lynch 2017, Wevers *et al* 2009). Delivery of group sessions was feasible and could be conducted on a ward or in a gym with basic equipment in other centres and could make a significant difference to patient outcomes. Two patients endorsed lack of motivation, energy and pain as personal barriers to exercise. Despite having support from their physiotherapist and family, they struggled to overcome these considerable challenges, which concurs with perceptions of other sub-acute stroke survivors (Damush *et al* 2007, Prout *et al* 2017, Rimmer, Wang and Smith 2008).

Limitations are inherent in an evaluation methodology. The sample size was small and convenient; eleven patients with severe physical, cognitive and communication impairments, and 17 with other neurological diagnoses, were excluded. The results suggest a minimum of twelve weeks of aerobic exercise to achieve a clinically meaningful training effect but it is difficult to conclude whether reported improvements in walking distance and speed were due to an increase in aerobic capacity or repeated gait practice. Questionnaires did not explore patients' responses in depth; a focus group was planned, but not possible, since seven of the eligible patients had communication impairments that prevented a group discussion. There was also no follow-up beyond discharge to determine if the gains were sustained and, if so, for how long.

The body of evidence on physical fitness training interventions after stroke is expanding. Large, well-designed randomised trials are necessary to define optimum exercise prescription, identify strategies to facilitate adherence, and validate the long-term benefits of exercise. The preponderance of evidence has focused on stroke survivors with mild to moderate impairments who are able to walk. Future research needs to examine how those with more severe

The body of evidence on physical fitness training interventions after stroke is expanding.

stroke, who are unable to walk, and have cognitive and communication impairments, may be supported to exercise since they may be especially vulnerable to aerobic deconditioning.

Recommendations for future service delivery

The proposed changes aim to deliver higher quality care and better functional outcomes for patients at this rehabilitation service. Functional goals will aim to strengthen patients' self-efficacy, self-management and long-term adherence to exercise. Patients' preferences, barriers and motivators to exercise will be incorporated into their rehabilitation. Outcome measures will be recorded more consistently, to measure change, motivate staff and patients, guide exercise prescription and to better evaluate the service. Exercise programmes will train all components of physical fitness, with a focus on muscle strength and endurance, as well as aerobic capacity, to achieve optimum functional gain. Group exercise sessions for patients with severe cognitive and communication impairments will be delivered 2:1, patients: assistant, to provide the level of assistance needed. This will remain more resource, time and cost efficient than individual sessions.

Clinical message

Inpatient rehabilitation is an opportune time to integrate regular aerobic exercise and encourage a more physically active lifestyle. Aerobic exercise delivered in a group setting can be tailored to an individual's needs, is time and resource efficient, and meets patients' satisfaction.

Conclusion

The current service is managing to achieve clinically significant differences for a specific group of stroke survivors. Prescription of exercise at an optimal aerobic intensity and duration is a challenge after stroke. Although the knowledge gained cannot be generalised to the wider stroke population, it may still be of broader interest to physiotherapists considering setting up a similar service or evaluating current service delivery.

APPENDIX

Questionnaire

Please answer the following questions about exercise after stroke, and your satisfaction with the exercise programme delivery.

The investigator is interested in your views so please be open and honest; your answers will be remain confidential. The findings are part of a service evaluation to make recommendations for the future.

If you would like more information, or have questions on how to complete the questionnaire, please contact the investigator.

Please tick (✓) **Are you filling this questionnaire for:**

Yourself ☐ **Your spouse or partner** ☐

Another relative or friend ☐ **Please state your relationship**

Exercise before your stroke. Please circle.

Did you exercise regularly before your stroke?	Yes	No

If yes, what was your preferred type of exercise?	Walking
	Running
	Cycling
	Swimming
	Team sports
	Exercise classes
	Other (please state)

On average, how often did you exercise each week?		How long would you exercise for each time?	
	1-2 days per week		0-20 minutes
	3-4 days per week		21-45 minutes
	5-6 days per week		46-60 minutes
	Daily		over 60 minutes

1

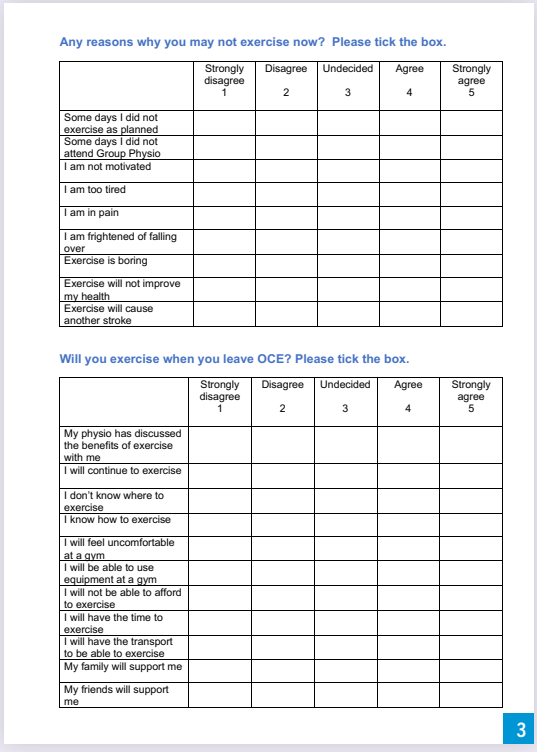
Exercise after your stroke. Please tick the box.

	Strongly disagree 1	Disagree 2	Undecided 3	Agree 4	Strongly agree 5
The equipment in the physio gym enables me to exercise					
The equipment on the ward enables me to exercise					
Group Physio at 1pm is a convenient time					
Group Physio at 3pm is a convenient time					
Group physio sessions are too short					
I can attend Group Physio often enough					
My exercise programme is not challenging enough					
My exercise programme has been progressed					
Exercise has been a priority in my rehabilitation					

What motivates you to exercise now? Please tick the box.

	Strongly disagree 1	Disagree 2	Undecided 3	Agree 4	Strongly agree 5
Goal: to feel stronger					
Goal: to improve balance					
Goal: to walk better					
Goal: to feel independent					
Goals: to improve my mood					
Support from my physio					
Support from my family					
Exercising with others in Group Physio					
Having the confidence to exercise					

2



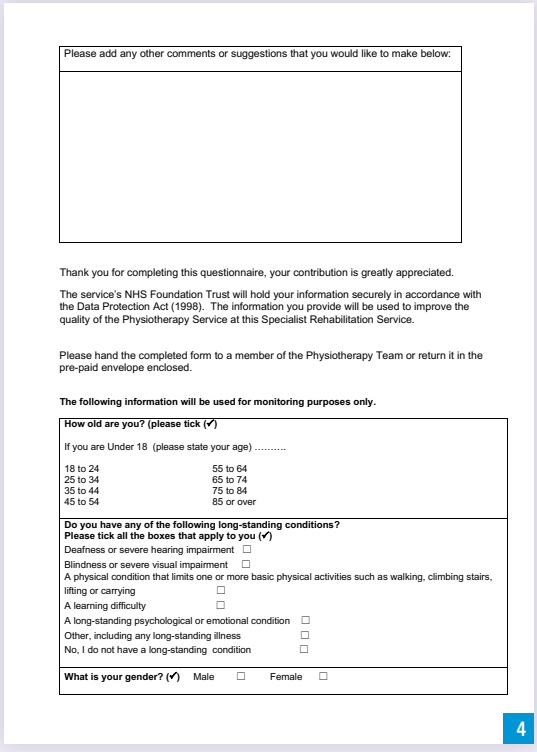
Any reasons why you may not exercise now? Please tick the box.

	Strongly disagree 1	Disagree 2	Undecided 3	Agree 4	Strongly agree 5
Some days I did not exercise as planned					
Some days I did not attend Group Physio					
I am not motivated					
I am too tired					
I am in pain					
I am frightened of falling over					
Exercise is boring					
Exercise will not improve my health					
Exercise will cause another stroke					

Will you exercise when you leave OCE? Please tick the box.

	Strongly disagree 1	Disagree 2	Undecided 3	Agree 4	Strongly agree 5
My physio has discussed the benefits of exercise with me					
I will continue to exercise					
I don't know where to exercise					
I know how to exercise					
I will feel uncomfortable at a gym					
I will be able to use equipment at a gym					
I will not be able to afford to exercise					
I will have the time to exercise					
I will have the transport to be able to exercise					
My family will support me					
My friends will support me					

3



Please add any other comments or suggestions that you would like to make below:

Thank you for completing this questionnaire, your contribution is greatly appreciated.

The service's NHS Foundation Trust will hold your information securely in accordance with the Data Protection Act (1998). The information you provide will be used to improve the quality of the Physiotherapy Service at this Specialist Rehabilitation Service.

Please hand the completed form to a member of the Physiotherapy Team or return it in the pre-paid envelope enclosed.

The following information will be used for monitoring purposes only.

How old are you? (please tick (✓)

If you are Under 18 (please state your age) .....

18 to 24 55 to 64
25 to 34 65 to 74
35 to 44 75 to 84
45 to 54 85 or over

Do you have any of the following long-standing conditions?
Please tick all the boxes that apply to you (✓)

Deafness or severe hearing impairment ☐
Blindness or severe visual impairment ☐
A physical condition that limits one or more basic physical activities such as walking, climbing stairs, lifting or carrying ☐
A learning difficulty ☐
A long-standing psychological or emotional condition ☐
Other, including any long-standing illness ☐
No, I do not have a long-standing condition ☐

What is your gender? (✓) Male ☐ Female ☐

4

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ABSTRACTS

Clinical

Spasticity in adults

Putting guidelines into practice at the Oxfordshire Stroke Rehabilitation Unit

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Introduction

The Oxfordshire Stroke Rehabilitation Unit (OSRU) is a 20-bed inpatient service, delivering specialist rehabilitation to patients following acute stroke. A review of current practice highlighted inconsistencies in staff approach to assessment and management of spasticity. The Royal College of Physicians published guidelines in 2018, outlining best practice for spasticity management in adults. These were reviewed, and a service development project was initiated. The aims were to improve the consistency of spasticity management, increase staff confidence in spasticity management, and enable access to early botulinum toxin intervention.

Method

OSRU occupational therapists and physiotherapists were surveyed to establish baseline knowledge and confidence in spasticity management. A series of actions were developed by the working party, including: staff training, development of resources, liaison and collaboration with other specialist services. A time frame of eight months was set for project completion, with a repeat staff survey to be conducted in October.

Results

Findings from the initial survey showed therapists had reasonable understanding of spasticity management (average score 5.2/10) but less knowledge of current best practice and guidelines (average score 4.2/10). Therapists were underconfident in leading a spasticity management plan (average score 2.6/10). Post implementation results will be collated subsequently.

Conclusion

Therapy staff at OSRU lack confidence to lead spasticity management plans. It is hoped the service development project will address this and improve patient care.

The hemiplegic shoulder pain integrated care pathway

A review

Michele Walsh[1], Stephen Ashford[1,2], Hilary Rose[1], Ejessie Alfonso[1], Aideen Steed[1], Heather Williams[1], Margaret Kaminska[1], Lynne Turner-Stokes[1,3]

Background

Hemiplegic shoulder pain (HSP) is a common complication of ABI, which can impact negatively on rehabilitation. Published in 2002, our integrated care pathway (ICP) for HSP records coordinated multidisciplinary intervention and outcome to improve our understanding of the range of presentation and the different physical/pharmaceutical interventions provided.

Method

Retrospective analysis of prospectively-collected data from an 18-year observational cohort study (n=358). Pain was assessed using the Shoulder-Q (numbered-graphic pain ratings/10 in 3 domains: rest, night-time and movement). 'Responders' had a decrease in pain of >=3 in any pain domain.

Results

193/358 (54%) responded to HSP management using the ICP. Broadly divided into 'Floppy-subluxed' (59%), 'Painful-stiff' (22%) or Mixed/Not Categorised presentations (19%) at initial evaluation, the population presented with weakness (94%), mechanical issues, ie reduced range of movement (78% < 60 degrees external rotation), subluxation (55%), spasticity (12%), and somatic issues (36%).

Physical interventions included positioning (66%), arm-support (in sitting 50%, standing 31%), education (59%), neuro-muscular-electrical-stimulation (24%), local pain relief (ice/transcutaneous-electrical-nerve-stimulation) (6%), strengthening (1%), sensory stimulation (16%).

Pharmaceutical interventions included simple analgesia (22%), anti-inflammatory medications (26%), opiates (12%), neuropathic-pain medications (9%), botulinum toxin (9%), steroid injection (4%), supra-scapular-nerve-block (2%).

Discussion

The ICP provides a systematic approach to clinical decision-making and outcome evaluation to support reflective practice. Pain response rates compared favourably to the literature (14%-27%), suggesting that integrated HSP management can improve outcomes.

Conclusion

Building on the current pathway, a revised algorithm was introduced to further guide differential diagnosis and treatment in this complex and poorly understood area of clinical practice.

Implications for rehabilitation

- The results of this study indicate that managing patients with hemiplegic shoulder pain using an integrated care pathway leads to improved rates of pain reduction
- A revised algorithm is proposed for further development and testing.

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"So you believe me?"

Treating a complex functional neurological disorder in the acute environment

Christian Holmes[1], Oliver Chillcott[2], Katriona Renton[2]

Background

Patients with Functional Neurological Symptoms (FNS) account for a significant proportion of those presenting to neurology services, often through emergency departments and hyper-acute stroke units. Patients with FNS tend to report high levels of disability, and severity of symptoms equivalent or greater than those with other neurological disorders. Despite this, it is often difficult for these patients to access effective interventions.

Case history

A 20-year-old woman presented to an acute neurology ward via A&E with a ten-year history of deteriorating functional neurological symptoms. These include non-epileptic attacks, migraines, dizziness and lower limb weakness. At the point of admission, NEAs occurred multiple times per day, and the patient had not walked for at least three years. Completion of activities of daily living and social participation were minimal. The patient had disengaged from local healthcare services at the point of admission.

Intervention

An interdisciplinary approach including physiotherapy, neuropsychology, neurology, occupational therapy and nursing delivered on an acute neurology ward. Intervention was constructed around a cognitive-behavioural understanding of FND and occurred over the period of two to three months. Engagement with local services in the community facilitated discharge.

Outcome

At point of discharge non-epileptic attacks had ceased, migraines had reduced to once weekly, and the patient was able to mobilise independently. At nine month follow-up, gains in mobility had been maintained as had reduced frequency of non-epileptic attacks. Social participation had improved. Total FIM scores, admission = 68 and discharge = 119.

Conclusion

An interdisciplinary intervention can be delivered in the acute environment in a manner which results in significant improvement in symptoms, and these can be maintained in the community. Engagement and collaboration between acute and community services for these patients is required, although often not achieved.

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Can an exercise group for people with mixed neurological diagnoses improve functional outcomes and self-efficacy towards exercise?

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Background

Physical activity is known to be beneficial in long-term neurological conditions. However, many personal barriers towards exercise have been identified including low outcome expectation, fear of falling, fatigue and disease burden (Ellis 2013, Learmonth *et al* 2013). Patient feedback specifically identified meeting others with a greater disease burden as a barrier to physical activity. A mixed diagnosis exercise and education programme was subsequently developed which focuses on improving patient function and self-efficacy.

Aim

To evaluate the effectiveness of an exercise and education programme on improving self-efficacy, within a group setting of mixed neurological diagnoses.

Method

The 'Neuro Active' programme was established to introduce individuals to exercise in a safe, structured environment. The programme consisted of five weeks of group education and exercise.

Patients were eligible to attend if they were known to the service, had a neurological diagnosis and could mobilise independently with or without a walking aid.

Outcome measures evaluated were the Timed Up and Go (TUG), TUG Cognitive, an informal hand dexterity measure (10-bean test) and the self-efficacy to regulate exercise scale.

Results

Data from two groups (eight participants) was collected. Improvements were seen for self-efficacy to regulate exercise scores (mean change of 8). Positive changes were seen for the TUG (mean change -2.78 secs) and a clinically significant change was seen for the TUG Cognitive (mean change -6.55 secs). There was minimal change in the 10-bean test. Subjective feedback from patients also demonstrated an increase in confidence to complete exercise.

Conclusion

'Neuro Active' allowed patients to participate in a mixed-diagnosis exercise and education programme that improved their self-efficacy and TUG Cognitive scores. This may translate into participation in ongoing activities outside of the class but needs to be investigated further. A full service evaluation of 'Neuro Active' will occur six months following its instigation.

Effects of hybrid Functional Electrical Stimulation assisted exercise on mobility in stroke survivors

Matthew White[1], Parveen Brar[2], Jon Graham[1]

Introduction

Functional Electrical Stimulation (FES) is an evolving therapy for the rehabilitation of stroke survivors. Multichannel FES systems provide stimulation to multiple muscle groups within a session combined with exercise. FES cycling has been shown to improve gait function, strength and endurance in stroke survivors but no research has yet investigated the effects of hybrid (upper and lower limb) FES exercise.

Method

Four stroke survivors completed ten 30-minute hybrid FES exercise sessions with stimulation applied to six muscle groups of the upper (biceps, triceps and infraspinatus or 'scapula stabilisers') and lower (quadriceps, hamstrings and gluteals) limb on their affected side. Pre- and post-test mobility was assessed using Five-Time Sit to Stand Test (5TSTS), Timed Up and Go Test (TUG) and 6-Minute Walk Test (6mWT). Power (Watts) and a calculated 'symmetry score' (= 100 - % asymmetry from hybrid system) in pedalling were averaged across hybrid FES exercise sessions two to five and across sessions six to nine. Sessions one and ten were excluded as assessment and reassessment sessions. Results were assessed against published minimum clinically important difference (MCID) data where available.

Results

All participants improved their 5TSTS (0.67-3.43s [5.76-30.11%]) and 6mWT (2.33-80m [1.08-24.06%]). Two participants achieved MCID in 6mWT (>34.4m). Three improved in TUG (1.37-2.26s [7.40-22.40%]), one achieving MCID (>2.5s). Power increased in all participants (3.06-9.75W [32.56-73.91%]) and, in three, symmetry score improved (1.75-13.25 [1.78-15.45%]).

Conclusion

Positive trends in physical and mobility outcomes from a short training programme suggest hybrid FES exercise shows promise for enhancing the mobility of stroke survivors and warrants further investigation.

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Effects of Functional Electrical Stimulation assisted cycling on mobility in people with multiple sclerosis

Matthew White[1], Parveen Brar[2], Jon Graham[1]

Introduction
Functional Electrical Stimulation (FES) assisted cycling is an evolving therapy for people with multiple sclerosis (PwMS), which has been demonstrated in small-scale research and case studies to reduce spasticity, and improve mobility and muscular strength in the stimulated muscles.

Aims
To investigate the effects of a short-term, moderate intensity FES cycling exercise programme on the mobility of PwMS.

Method
Four PwMS (one with FAC 0, one with FAC 1, and two with FAC 5) completed ten, 30-minute FES cycling exercise sessions over four to six weeks with stimulation applied to six lower limb muscle groups (from gluteals, quadriceps, hamstrings, tibialis anterior and gastrocnemius). Pre- and post-test mobility was assessed using 5-Time Sit to Stand Test (5TSTS), Timed Up and Go Test (TUG) and 6-Minute Walk Test (6mWT). Power (Watts) and a calculated 'symmetry score' (= 100 - % asymmetry from cycle) in pedalling were averaged across FES cycling sessions two to five and across sessions six to nine. Sessions one and ten were excluded as assessment and reassessment sessions. Results were assessed against published minimum clinically important difference (MCID) or minimum detectable change (MDC) data where available.

Results
All PwMS improved in 5TSTS (2.19s-20.15s [13.38%-41.06%]). Two of the four improved by >25%. The subjects with FAC 0 and FAC 1 did not complete TUG and 6mWT. One of the completers improved TUG by 0.84s (9.84%), but neither completer achieved MDC. Both improved 6mWT (4.5m -78.5m [1.32%-28.70%]), with one achieving MDC. Cycling power improved in all (0.05W-12.15W [6.67%-290%]). Three PwMS improved their symmetry score (0.75-6.78 [0.76-6.78%]).

Conclusion
FES cycling improves the mobility, cycling power and pedalling symmetry of PwMS at various stages of disease progression. Further large-scale research is required to further investigate these effects.

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Rehabilitation following tetraplegic hand surgery
A multidisciplinary team approach

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Background
Literature suggests patients who sustain a cervical spinal cord injury should be examined and assessed for the potential for surgical reconstruction of hand function. Despite this, in many areas it is underused or absent.

Patient X presented on the Intermediate Neurological Rehabilitation Unit with incomplete tetraplegia secondary to C6-7 subluxation following a traumatic spinal injury.

On assessment his left upper limb function was severely limited by hand posture and instability, weakness and spasticity. He had maintained grade 3/5 power within elbow flexors, and wrist and elbow extensors but had limited functional use due to the restrictions within his hand.

Method
Pre-surgery MDT members discussed pre- and post-operative management and expectation for rehabilitation. Pre-operative rehabilitation aimed to optimise joint alignment, strength and range of movement, a resting splint was fabricated to promote wrist extension and support hand architecture and an exercise splint made to encourage independent active IPJ movement whilst stabilising MCPJs.

Reconstructive surgery comprised of multiple tendon transfers and joint stabilisations to optimise muscle imbalance and potential for hand function.

Immediately post-operatively the patient utilised a bespoke resting splint continuously over a 24-hour period, removed only for facilitated exercise. Rehabilitation to optimise independent movement, range and strength was introduced progressively and electrical stimulation introduced at 6 weeks to assist this.

Results
A significant improvement was noted in the hand's resting posture and improved access available for hygiene purposes.

Patient X has more selective digit movement, particularly within the MCPJ. Improvement was noted in selective thumb movement and lateral key pinch grip. Functionally there is improved grasp and release and potential for further independence in feeding and use of his mobile devices with ongoing rehabilitation.

Discussion
This opportunity has raised the profile of this surgery and increased the team's awareness of how it may be considered to further a patient's functional rehabilitation.

Implementation of exercise classes on an intermediate neurorehabilitation unit to address aerobic activity and cardiovascular fitness

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Background
It is well accepted that a sedentary lifestyle can result in reduced aerobic activity and cardiovascular fitness. This is heightened when living with a neurological impairment, increasing the risk of developing secondary complications such as generalised deconditioning, fatigue, impaired cognition and depression. Participation in regular aerobic activity and cardiovascular fitness training may reduce these risks. In neurorehabilitation, inpatient settings intervention often focuses on improving impairment and function and less so on increasing cardiovascular fitness due to limited time and resources.

Aim
To increase patient activity and participation in function and improve clinical outcomes on an intermediate neuro-rehabilitation unit (INRU) through increased therapeutic aerobic activity and cardiovascular fitness intensity.

Method
Classes were introduced on a daily basis to augment therapeutic intensity and promote increased activity for appropriate patients on the INRU.

- **Circuits Class**: Individualised and graded progression of cardiovascular and strengthening exercise.
- **Drop In**: Supervised use of cardiovascular equipment and individualised exercise programs.
- **Movement to music**: Focused on activity, participation and mood.

Results
Physiotherapy contacts increased by an average of 56 sessions per month, suggesting an increase in therapeutic activity and participation in function.

Data from ten patients, five pre and five post the introduction of the new classes, were evaluated.

- Average length of stay (LOS) reduced from 163 to 108 days.
- FIM FAM scores – no significant change noted.
- Barthel – mild increase in scores noted but not significant.

Similar patient outcomes were achieved pre and post introduction of classes but within a shorter LOS, thus maximising the effectiveness of therapy input and reducing the overall cost of inpatient admission. Patient feedback identified the classes as enjoyable, meaningful and beneficial.

Conclusion
Implementation of more individualised, bespoke exercise programmes is a simple but effective addition to the therapeutic interventions on an INRU. Additional classes and fitness training alongside conventional therapy may result in improved outcomes and reduced LOS.

The impact of in-reach neurorehabilitation physiotherapy on an acute surgical ward

A patient case study

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Background
Neurological patients on the acute hospital site have received limited rehabilitation whilst on acute surgical or medical wards. Inpatient therapists have tended to prioritise patient discharges over those requiring active rehabilitation.

Purpose
The purpose of this case study was to evaluate the impact of in-reach neuro-rehabilitation physiotherapy in the acute hospital setting.

Method
The patient was assessed, and set patient-centred goals. The main goal was to progress from hoist transfer to standing and eventually mobilising. This was achieved through a progressive neurorehabilitation approach, of tilt-table/stand aid, parallel bars and therapist-facilitated standing and mobility. This was supplemented by thera-trainer (assisted cycle) bed and chair based strengthening exercises and working closely with nursing staff around safe transfers outside of therapy sessions. Patient goals were regularly reviewed and progressed. In total the patient received two sessions of qualified therapy a week for four weeks and additional therapy assistant exercises on two to three days of the other working days of the week

Results
The patient achieved her goal, progressing from hoist transfer to being mobile 30m with assistance of two in four weeks. She was transferred from the acute hospital to the neuro-rehab unit, with a length of stay of 44 days (44 days less than the average length of stay on the neuro-rehab unit). Patient feedback was positive.

Conclusion
This case study provides preliminary evidence for in-reach therapy in terms of patient recovery, reduced length of stay and patient satisfaction.

Implications
A larger scale evaluation needs to be undertaken, with scope to explore the reasons behind why this caseload of patients are neglected in the acute setting.

Development of sensori-motor testing in patients undergoing awake tumour resection involving supplementary motor area

Ellie Stephenson[1], Rachel Waddington[1], Seonaid Ewan[1], Sara Cooper[1], Laura van Hille[1], Ryan Mathew[1,2]

Background
Neuro-physiotherapists at LTHT test sensori-motor function during awake craniotomies. They provide pre-operative assessment including preparation for intra-operative testing and anticipation for post-operative experience. The supplementary motor area (SMA) has rich connections to cortical and subcortical structures (Vergani *et al* 2014) and plays an important role in the intention-to-act and the specification and elaboration of action. Between 10–27% of tumours are located in the SMA (Duffau & Capelle 2004) and are commonly excised during awake craniotomy. Literature and our clinical experience indicated that patients who have tumour excision involving SMA, often present with SMA syndrome (Duffau & Mandonnet 2013). This identified a clinical need to review our underpinning knowledge of the SMA and the skills required to accurately assess it. In addition, we aimed to apply our knowledge to more accurately inform patients.

Aims
- Understand functional neuro-anatomy of the SMA within clinical practice.
- Optimise sensori-motor testing of the SMA.
- Ensure patient information gives adequate preparation for intra-operative testing and potential post-operative deficit.

Method
A preliminary literature search of SMA functional neuro-anatomy and clinical implication. Analysis of previous cases to establish the predicted functional outcome for patients.

Outcome
Limited published evidence relating to awake motor testing for SMA tumours (Rech 2017). Developed pilot guidelines for SMA sensori-motor testing. Updated information provided to patients.

Conclusion
Neurophysiotherapists are specialists in assessment of sensori-motor performance therefore are ideally placed to recognise deficit. We have recognised the need to advance sensori-motor testing of the SMA therefore SMA testing has evolved and is evolving. Patient information reflects our newly acquired knowledge of SMA and SMA syndrome.

Our ongoing work involves undertaking a more specific review of SMA and SMA syndrome literature. Our principal aim is to develop a robust tool to use specifically in the assessment of SMA syndrome.

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Implementing a neurotechnology upper limb rehabilitation service in Bristol

Three case studies showing the effectiveness of intensive rehabilitation combining conventional therapy with robotics

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Background
There is a lack of focus on upper limb (UL) rehabilitation after stroke in the acute setting. The therapy focus is often on transfers, mobility and discharge planning. There is little time for UL rehabilitation, a lack of knowledge of how to treat the UL amongst therapists, and a culture of acceptance that the arm is unlikely to recover due to poor UL statistics. However, we know from the literature, and other successful UL models of rehabilitation, that changes can be made in the UL after stroke with high intensity rehabilitation and repetition. Hobbs Rehabilitation have therefore implemented an intensive upper limb rehabilitation service combining conventional neuro-physiotherapy with neurotechnology, allowing us to increase repetitions and retrain movements in a fun, stimulating way.

Method
Case studies have been completed for three participants, with a diagnosis of stroke, who attended the UL course over the last year. Each of these clients achieved at least 40 hours of therapy over a course of three to four weeks and were treated daily with neurophysiotherapy and robotics. All clients used Tyromotion machines: PABLO, AMADEO, TYMO and DIEGO. Outcome measures (OMs) were collected at the start and end of treatment.

Results
Two of the clients showed improvement in all OMs. One client showed good improvements in the physical outcomes but scored herself lower on two self-rating subjective OMs. Each client showed improvement of 6-8 points on the Fugl-Meyer Upper extremity scale.

Discussion/Conclusion
A 6 to 8-point increase on the Fugl-Meyer is clinically significant, and functional improvements in all clients were demonstrated by an increase on the Chedoke Arm and Hand Activity Index. There is some inconsistency in client self-rated OMs resulting in reduced reliability. High intensity UL rehabilitation combined with neurotechnology is effective and resulted in clinical improvement in the upper limb after stroke.

A scanning wall for visual inattention

Understanding its assessment and therapeutic use

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Background

Visual Inattention/neglect is linked to poorer outcomes in stroke patients. The scanning was designed to trial as an assessment tool and treatment option.

Aim

The aim of this project was to investigate a novel assessment of visual inattention/neglect post stroke, by creating a therapy scanning wall.

Method

The scanning wall was created in a quiet environment, minimising the influence of auditory stimulus. Pictures were positioned on a 2.7m x 4m wall. The design separates the visual quadrants and has the same number of pictures to scan in each quadrant. These pictures were placed on three circles like a target.

Suitable patients were assessed with the Alberts test to allow for comparison.

Patients sat on a chair at a set point, directly facing the middle of the wall and were asked to name the individual pictures they could see.

Nine patients were included in total; three patients used the wall on assessment and discharge only, six used the wall for assessment and treatment.

Results

- Four out of nine patients showed significant visual inattention when using the wall; however, they marked through all the lines on the Alberts test.
- Five of the six patients using the wall for treatment showed carryover between sessions.
- The use of the scanning wall for assessment helped understanding of the patient's deficit, and shaped treatment plans within standard therapy.
- Increased postural orientation was observed, with increased spatial awareness of the affected side.

Conclusion

The scanning wall could give an accurate representation of visual inattention/neglect within the wider environment/extrapersonal space.

A pilot study is required to investigate the therapeutic use and possible carryover through learning from using the scanning wall as a treatment.

Development of an exercise and self-management group for early-stage Parkinson's Disease

James Alexander[1,2], Vicki Powell[1]

Background

Evidence has shown exercise in early Parkinson's Disease (PD) to have multiple physiological and psychological benefits. Self-management support is a critical element of effective chronic condition management but existing self-management support programmes vary considerably in structure and content. Both are recommended by international guidelines for people with early PD; however these are often not met.

Aim

This study will assess whether an exercise and self-management group for people with early PD:

- Is feasible within the community setting.
- Can increase confidence with self-management of individuals' PD.

Methods

Participants will be aged 18+, diagnosed with idiopathic PD, Hoehn & Yahr stage 1 or 2, able to participate in group exercise and discussion.

Feasibility will be established through a patient survey following an initial pilot group and subjects will also be invited to participate in a focus group. Self-management will be assessed through pre and post group questionnaires using 2 Patient Activation Measures.

The group consists of six two-hour sessions including one hour of exercise and a one hour peer-support self-management workshop. The exercises are based on the PD warrior programme, whilst the self-management workshops are based on the Bridges Self-Management enterprise.

Descriptive analysis will be used to look at the pilot group survey data. A paired t-test will be used to compare pre and post group intervention PAM scores. Thematic analysis will look at qualitative data from the focus groups.

Results

Data from the group is being analysed currently. Five participants took part in the pilot group. One participant attended four sessions, two attended three sessions and two attended two sessions. All participants' PAM scores either improved or were maintained. Thematic analysis revealed the sessions were highly valued and it was felt more sessions were needed to consolidate learning the exercises and self-management concepts.

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Measurement of compensatory movement strategies

A useful outcome measure?

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Background

Abnormal gait patterns following stroke are primarily due to impairments caused by neurological damage. Patients will, however, learn to adapt and compensate for any impairments, adding to deviations from normal gait that are observed. Direct treatment to reduce compensatory movement strategies without simultaneous input to address the primary neurological impairments are unlikely to be successful and may reduce a patient's ability to walk. Measurement of reductions in compensatory movement strategies, however, could be useful to assess the outcomes of interventions focused on primary neurological impairments and on gait functioning.

Aims/purpose

We present the case of a 53-year-old man with a left hemiplegia following stroke. Gait analysis showed abnormal stance and swing phases on the left side with excessive flexion of the right knee thought to be a compensatory strategy to aid swing phase of the left leg. Interventions were targeted towards improving the underlying neurological impairments on the left and re-educating normal gait on that side. We hypothesised that the compensatory strategy of the right leg during gait would reduce, consistent with any improvement of the left leg impairments.

Method

Video gait analysis was used to record peak knee flexion of the right knee during swing phase of the left leg at the start of treatment and following twelve months of intervention. Gait speed was also recorded.

Results

Right knee flexion reduced from 40° to 29°. Gait speed increased from 0.33m/s to 0.75m/s. Qualitatively, at the end of the intervention, the patient no longer required a walking stick to walk.

Conclusion

Identifying compensatory movement strategies distinct from underlying neurological impairment and directing intervention towards impairments rather than to compensatory activity is important for effective treatment. This case demonstrates, however, that measurement of a reduction in compensatory movement strategies can be useful for monitoring functional recovery.

What is the outcome of rehabilitation of stroke patients in South Gwent,Wales?

Amer Jafar[1,2], Joshua Pluck Rose[1], Henry Dewhurst[2]

Background
This study aims to look at the outcome of stroke rehabilitation by analysing data from patients in Royal Gwent Hospital/St Woolos Hospital (Regional Stroke Rehabilitation Unit).

Material and Method
Stroke patients were retrospectively assessed over the last two years from 1st March 2016 – 1st March 2018 using the admissions book from the stroke rehabilitation ward. The clinical workstation and the online patient database, was then used to create a spreadsheet showing the demographics of patients with strokes, the type of stroke they had, based on the Bamford system, the length of admission and the outcome of the patient's rehabilitation.

Results
Three hundred and fifty-three patients were analysed over a two-year range, with an average age of 78 years old and an equal gender ratio of 1:1. 46% of patients were discharged home after successful rehabilitation, 50% were transferred to an alternative placement (Residential or Nursing Homes) for further rehabilitation/care in the community and 4% passed away. Of the 46% patients who were discharged home; 52% were female, at an average age of 75 years old, with most having suffered from a Lacunar Stroke and having stayed in hospital for an average of 42 days. Of the 50% who were transferred to an alternative placement, 52% were male, at an average age of 81 years old, with most having suffered from a Total Anterior Circulation Infarction (TACI) and having stayed in hospital for an average of 50 days.

Conclusion
While St Woolos Hospital (Regional Stroke Rehabilitation Ward) was performing well in the field of stroke rehabilitation, there is still room for improvement, including; more resources and therapies used in rehabilitation and more efficient referrals to the stroke rehabilitation ward. To improve the outcomes of Total Anterior Circulation Strokes, greater resources can be used by the multidisciplinary teams to improve prognosis.

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Orthotic management of clonus

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Clonus is a clinical presentation of uninhibited rapid repeating muscle contractions seen in the presence of upper motor neuron disturbance. Clonus can be both disabling and distressing to patients. This presentation is of a hemiplegic patient presenting with clonus in the calf complex and describes how modifying orthotic intervention can control the clonus and improve function.

This presentation demonstrates how clonus can be managed by modifying orthotic intervention and is illustrated by a case study presenting outcomes of intervention.

Method
Clonus responds positively to stretching the affected muscle, both in inhibiting onset and stopping the presentation once initiated. An orthosis may be used to provide stretch; however, the resultant position may require modification for function. In the case presented, the patient has clonus in her calf despite wearing a well-tuned AFO. Stretch is increased by increasing dorsiflexion of the AFO; however, the pitch of the shoe then needs to be modified to optimise function. A video is presented with AFO tuned and modified along with impact on gait parameters and Activity Specific Balance Confidence Scale.

Results
A video will be presented without AFO, with Tuned AFO and with modified AFO showing changes in quality of gait and alignment. The effect on 10-metre timed walk (10MTW), Timed Up and Go (TUG) and Activity Specific Balance Confidence Scale (ASBCS) are presented.

- 10MTW: 17 steps 30.8 seconds, 14 steps 21.3 seconds
- TUG: 29.6 23.1
- ASBCS: 21.875 73.75

Discussion and conclusion
The results and video presented show the impact and positive effect orthotic intervention may have on patients presenting with uncontrollable clonus and how the intervention may need to be modified to optimise function.

Further reading
1 Dimitrijevic MR *et al* (1980) *Clonus: the role of central mechanisms* Journal of Neurology, Neurosurgery and Psychiatry 43 (4) pp321-332.
2 *Upper Motor Neurone Syndrome and Spasticity, Clinical Management and Neurophysiology* Second edition (2009) Barnes P, Johnson GR (Editors) Cambridge University Press.

Developing confidence, capability and competence in exercise prescription for people with Parkinson's

Julie Jones[1], Katherine Baker[2], Bhanu Ramsawamy[3], Beccy Oliver[4] on behalf of the Parkinson's Excellence Network – Exercise Hub[5]

Introduction
The benefits of exercise are widely acknowledged, supported by a rapidly evolving evidence base. However, many exercise professionals are not equipped to effectively manage Parkinson's, which presents with a complex array of motor and non-motor symptoms.

Aims
To develop an informed educational package which can be delivered by Exercise Professionals to develop capability, competency, and confidence in exercise prescription for people with Parkinson's.

Method
A mini Delphi approach was undertaking utilising a convenience sample of specialist Parkinson's exercise prescribers (n=65), who attended two national workshops. Prescribers were given a series of questions to gain insight into the perceived knowledge, skills and attributes which are required for effective management of Parkinson's. These were reviewed at subsequent meetings, leading to development of consensus of opinion.

Results
The perceived learning needs included applied pathophysiology, evidence base behind treatment interventions, in particular mechanisms and approaches to promote potential, neuroplasticity and neuro-restoration. Knowledge on pharmacological management can provide targeted education so was also perceived as desirable. Practical guidance on the design, and implementation of evidence informed the exercise classes. Development of skill based competencies was seen as desirable for complex condition management such as dystonia, dyskinesia. Key future learning needs were critical engagement and evaluation of the literature to inform practice.

Conclusions
To develop practice, refreshing of pathology and the impact this has on motor control, and current evidence to support exercise prescription were seen as immediate priorities. Development of clinical competency on management of complex phases of Parkinson's and keeping up to date with current literature and ability to apply this to practice were perceived desirable but not essential. The findings of this study have been used to inform the development of a nationally available presentation which can be used locally to inform and develop local confidence in effectively managing Parkinson's.

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The Hemiplegic Upper Limb Category project (HULC)

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Background
Hemiplegic shoulder pain and injury is common in stroke recovery with an incidence of up to 84% (Fotiadis *et al* 2015). Mechanisms of hemiplegic shoulder pain are unclear making therapeutic treatment options unclear (Jones & Brown 2013). The complexity of differential diagnosis of shoulder pain brings its own challenges. Both physiotherapy and OT are involved in upper limb (UL) rehab with a variety of skill mix. This blurred boundary approach and complex presentations creates vulnerability and high risk of pain.

Aims
The purpose of this project was to bring multidisciplinary working into a harmonised approach to UL rehabilitation, ensuring patients receive consistent and clear advice.

Method
A questionnaire was circulated to all therapy staff to measure the level of confidence in managing UL. Three patient advice leaflets were created depending on severity of symptoms. These were studied by all therapists and given to patients throughout the stroke pathway. Following six months of use the staff questionnaire was re-circulated.

Results
- Pre leaflets:
  28 responses – 61.5% level of confidence
- Post leaflets:
  27 responses – 60.5% level of confidence

No significant improvement was shown in staff confidence levels post intervention. Despite this, staff feedback was very positive; a good way for advice to be accessible to patients and families following therapy sessions. Patients gave positive feedback: "It was nice to have it written down", "I didn't realise it was so complicated but it was easy to understand".

Discussion
A harmonised approach to UL advice was achieved. A benefit to the patients in terms of advice and self-management was identified but little direct impact on staff levels of confidence. Pre and post study questionnaires are likely to have been completed by different staff members due to the high volume of rotational staff. These leaflets are now embedded into normal practice on the stroke pathway.

Embedding a system of effective self-management support within a community neurology service
A 'Quadrant model' for patients with neurological conditions

Pamela Bailey, Dr Amy Wright, Sandra Jury
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Background
Supporting patients to actively engage in their own health care is essential to achieve optimal health outcomes (The Health Foundation, 2015). The Community Neuro Service (CNS) in Portsmouth (Solent NHS Trust) provides multidisciplinary support to an average caseload of 800 patients with neurological conditions from diagnosis to end of life. The 'quadrant model' (QM) (Dr Ollie Hart 2018) provides a framework to assess a patient's capability to manage their long-term condition in combination with medical complexity.

Aims
- Explore the feasibility of applying an adapted QM as a framework to systematically assess patient activation together with medical complexity for patients with neurological conditions.
- Use the QM to identify patient needs specific to each quadrant segment and tailor intervention approaches according to these needs within the CNS multidisciplinary team.
- Identify gaps in current CNS service provision and clinician skill to meet identified patient needs.

Methods
The quadrant model has been adapted to reflect medical complexity for patients with neurological conditions. This QM, which incorporates the Patient Activation Measure, is being trialled as part of a patient's initial assessment. The quadrant segments lend themselves to definition of typical needs and characteristics of patients; appropriate interventions; and the skills clinicians require to provide them.

Results
We present a refined QM specific to neurological conditions and service provision as part of a CNS.

Conclusions
The adapted QM takes into account the range of factors that compromise medical complexity within neurological populations, whilst providing structure to the assessment of a person's capability to manage their condition.

A single case study of pregnancy, childbirth and the postnatal period in a primigravida with Facioscapulohumeral dystrophy (FSHD)
A multidisciplinary approach

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FSHD, an autosomal dominant condition affecting the muscles of the face, shoulders, trunk and limbs, is the second most common muscular dystrophy seen in adults. The phenotype is variable but anticipation can be expected. This study is of a 30-year-old primigravida with FSHD, a non-ambulant power wheelchair user, undertaking a planned pregnancy (without pre-implantation genetic diagnosis). Pre-pregnancy, she had severe and widespread weakness, kyphoscoilisis, a history of low back pain, and right shoulder tendinitis.

Pregnancy and childbirth has a potentially deleterious effect on FSHD disease progression (Ciafaloni E *et al* 2006). Furthermore, pregnant women with disabilities (5-10% of pregnancies) have a higher risk of inadequate prenatal care, hospital admissions during pregnancy, caesarian sections, pre-term deliveries and low birth weight babies. When interacting with health professionals, mothers have also experienced insensitivity, lack of knowledge about disabilities, inadequate support, and discriminatory practices. (Konig-Bachmann M *et al* 2019).

A multi-disciplinary obstetric, midwifery, physiotherapy and community team (MDT) was formed at the end of the first trimester to monitor the patient closely. By the second trimester she was unable to transfer independently, and she developed meralgia paraesthetica and gestational diabetes by 18 weeks.

For the birthing process itself, the MDT identified a number of specific supporting measures:

- Adapting the environment and providing appropriate equipment.
- Respecting her birth plan choices.
- Acknowledging her as an 'expert', able to educate the team.
- Showing sensitivity to her situation, avoiding judgement or discrimination.

After admission at 38 weeks, induction, and a trial of labour, she underwent a caesarian, after failure to progress. She had a healthy baby girl weighing 5lbs. Thigh pain resolved immediately and on follow-up she had returned to her functional baseline. The case has highlighted for the team the value of a multi-disciplinary approach for pregnant women with muscle disease.

Introducing the Andago® 2.0 over-ground Body Weight Support (BWS) gait training into rehabilitation practice

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Background
The Andago ® 2.0, from the Hocoma robotic range, is an over-ground Body Weight Support (BWS) gait training device that enables gait training to be self-directed. Patients can select their own speed and direction and negotiate obstacles, providing an opportunity for high intensity adaptive gait training. The Andago® can reduce the need for physical assistance compared to traditional methods of over-ground gait training. In July 2018, The Royal Hospital Donnybrook was the first rehabilitation setting in Ireland to acquire the device. This study is a review of the integration of the device into rehabilitation practice.

Method
Utilising a mixed methods design of prospectively gathered data, this study examines therapists' utilisation of the Andago ® 2.0 in a rehabilitation hospital including: patient selection, clinical decision-making regarding application, a survey of therapists' reflections and patients' subjective experience of intervention. Participant informed consent is obtained.

Results
To date, 41 recorded sessions have been examined for 14 patients, (ten male, four female) with a mean age of 51 years. All patients had a neurological deficit including: acquired brain injury/stroke (n = 9), central cord syndrome (n = 1), MS (n = 1), Myotonic dystrophy (n = 1), Critical illness polyneuropathy (n = 1), and Guillain Barre (n = 1). Gait deficit ranged from 0-3 using the functional ambulation category. Multiple positive themes around therapeutic application were identified.

Conclusion
Therapy applications have included early standing and knee control practice, dynamic standing balance in a semi-supervised environment, endurance and adaptive gait training. Feeling 'safe' appeared important to patients with a positive impact on their ability to 'focus' on walking quality, and confidence to walk further and faster. In practice, this device provides clinicians the opportunity to safely explore the limits of the ability of mobility-impaired neurological patients while maintaining patient confidence.

A clinical test to identify motor deficits in stance phase of gait in hemiplegia

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Background
This presentation describes a simple clinical test which highlights the control deficits in stance phase of gait, leading to more appropriately targeted therapy.

Method
The key causes of knee hyperextension in hemiplegia gait are described and explained from a biomechanical perspective.

The foot is secured with the tibia over the foot, slightly inclined as in early stance in normal.

A hand is placed over or below the patella to stabilise if required.

The patient is placed in a safe environment in the case of anticipated poor hip extension.

The patient is instructed to take a step with the unaffected leg which in turn loads the effected side.

The test is described and shown on video; it involves aligning the hemi paretic leg to normalise the moments generated at the ankle, knee and hip then stepping over that limb such as to fully load it.

Results
Heel rise; extensor tone.

Assessor needs to apply a high force to the front of the knee; poor knee extension control.

Assessor needs to apply a large force to the back of the knee to limit full extension; increased tone in knee extensors; poor hamstring control; poor proprioception.

Collapse into hip flexion; poor hip extension.

The effect of this loading on a normally aligned limb highlights the deficits by placing demands on the tester to maintain stability; the consequences of this are identified and discussed.

Conclusion
The test is primarily a diagnostic test; by highlighting the underlying causes, the best treatment options can be explored. This test may be useful for physiotherapists and orthotists.

Can people with multiple sclerosis with limited mobility due to a foot drop maintain benefits from eight weeks of Functional Electrical Stimulation at four-week post intervention follow-up?
A series of case studies

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MS Society of Ireland, Galway, Ireland

Background
Systematic reviews and qualitative papers provided evidence of various positive orthotic benefits of Functional Electrical Stimulation (FES) on gait kinematics and quality of life in people with multiple sclerosis (pwMS). However, there is very little evidence about the therapeutic and maintenance effects of FES in pwMS attending community settings.

Aims
To investigate the therapeutic effect of eight weeks of FES in pwMS with different level of mobility on gait speed, muscle endurance and impact of MS on daily activity. Additionally, to examine if changes can be maintained four weeks after stopping treatment.

Method
It was a series of case studies conducted in a community setting in Multiple Sclerosis of Ireland. Pre and post eight weeks of FES data was analysed and at four weeks post intervention with no FES stimulation. Two females and one man were examined. Gait speed was assessed using 10-metre walk test (10mWT), muscle endurance with 6-minute walk test (6mWT) and quality of life with Multiple Sclerosis Impact Scale 29 (MSIS29). All tests were performed without an FES system. People attended two one-hour sessions a week. The exercise programme consisted of walking with FES for 30 minutes at various walking pace, distance and surfaces, stairs training, stepping over an aerobic step, kicking a football and sit to stand. Bioness L300 was used.

Results
All participants improved on 6mWT, 10mWT and MSIS29 after eight weeks of treatment. The greatest change was 25 meters on 6mWT which is considered a clinically meaningful change in pwMS. All participants further improved on these measures at the four week follow-up. No adverse effects were reported.

Conclusion
FES training was safe and resulted in clinical improvements in gait that was maintained at follow-up. These case studies provide further data about the therapeutic and maintenance effects of FES intervention in the community setting.

A neurological training programme implemented within Gaza's Ministry of Health physiotherapy services

A case report

Luke Stevens[1], Hazel Norman[2]

Background
The population occupied in Palestinian territories are impacted daily by being subject to restricted movement, imposing stressful bureaucratic control, homes and livelihoods being threatened and repeated military attacks. Physiotherapists working in Palestinian territories have limited access to opportunities such as specialist education and continuing professional development, and work within a healthcare system with limited infrastructure and resources. A high number of TBIs and complex SCIs have been a result of repeated military attacks against Palestinian demonstrations. Effective and accessible healthcare is a primary focus for all systems across the world. However, this is not reflected for Palestinians living in Gaza.

Aims/purpose
Medical Aid for Palestinians have a vision "where all Palestinians can access an effective, sustainable and locally-led system of healthcare and the full realisation of their rights to health and dignity". MAPuk deployed two physiotherapists to Gaza delivering practical neurological training to local physiotherapists.

Methods
This is an experiential account of physiotherapists deployed as part of a humanitarian mission to Gaza through MAP UK to deliver neurological training and work alongside the local rehabilitation services.

Discussion
Our approach included theory based teaching around common neurological conditions and their management such as: SCI, stroke rehab, gait analysis and facilitation. These were accompanied by case studies and practical sessions between therapists and then used later on in real patient treatment sessions. In conjunction with this we were invited to the Ministry of Health to provide recommendations for development of rehabilitation services within Gaza. We outlined a need for moving and handling equipment, seating and setting up an online platform to facilitate further education and development in the future.

Conclusion
The programme we delivered received positive feedback from the local Palestinian physiotherapists. Our aim is to deploy again and facilitate discussions via a Facebook group around EBP and complex patient cases.

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Research

A retrospective analysis of ankle contracture outcomes for patients with Acquired Brain Injury following inpatient tertiary specialist neurorehabilitation

Charlotte Elsmore[1], Aideen Steed[1], Alice Walden-Smith[1], Emma Stavrou[1], Heather Williams[1], Stephen Ashford[1,2,3]

Background
Intervention for ankle contractures following acquired brain injury (ABI) may include serial casting, standing, gait re-education, orthotics, spasticity management (eg botulinum toxin) and surgery. Objectives were to retrospectively examine outcomes of ABI patients with ankle contracture.

Method
In-patient episode data from a level-one rehabilitation unit was analysed (2015-2018). Those in Prolonged Disorder of Consciousness and/or pre-morbid contracture were excluded. Main measures were range of movement (ROM), Functional Ambulatory Category (FAC) and Functional Independence Measure (FIM). Contracture severity was categorised as mild (plantargrade or better), moderate (<plantargrade to -200) or severe (> 200 off plantargrade). Analysis completed using Wilcoxon signed rank test.

Results
Sixty-five patients had ankle contracture, mean age 41 (36 Male, 29 female). Of the 65, 35 had bilateral contractures (n=100; 39=mild, 31=moderate, 30=severe) and seven severe and one moderate underwent surgical tendo-achilles lengthening.

Overall, there was significant improvement in ROM (mean change=130; ± 17), FAC (2; ±2), increased FIM mobility (11; ± 6) and FIM locomotion (10; ±5) p=0.00.

Subgroup analysis demonstrated significant change in ROM for the severe (340, ±19) and moderate (12 ±10) groups p=0.00.

The surgical group had significant change in ROM (410, ±22) and function (FAC 2, ±2, FIM mobility 9; ±7, FIM locomotion 4, ±4,).

The mild group had no deterioration in ROM (-10, ±9) p=0.59) and the greatest mean change in functional measures (FAC 3, ±1; FIM mobility 10, ±5; FIM locomotion 5, ±4) p=0.00.

Discussion/Conclusion
Significant change in functional outcomes was observed in mild contracture, but not in ROM. The moderate group had a significant improvement of ROM and function. For a small number of patients with severe contracture, surgical intervention led to the greatest mean change of ROM, but more modest changes to function. Future work needs to explore which patient group benefits most from particular interventions or combination of interventions.

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Conceptualising post-stroke fatigue
A cross-sectional survey of UK-based physiotherapists and occupational therapists

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Background
With survival after stroke improving, more individuals are discharged into the community with multiple and persistent deficits. Fatigue is a common unmet need for stroke survivors, but there are no evidence-based guidelines for its assessment and management. This study explored how UK-based therapists conceptualise post-stroke fatigue in current practice.

Objective
To describe current understanding of post-stroke fatigue (PSF) amongst physiotherapists and occupational therapists.

Design
A cross-sectional online survey using Qualtrics software (a survey creation and analysis programme) was sent to therapists working with stroke survivors in 2019. Responses to the open-ended question, "How would you describe post-stroke fatigue if approached by another healthcare professional?" were analysed thematically by two independent researchers aiming to identify and exhaust all pertinent key themes.

Participants
One hundred and thirty-seven survey respondents (71 physiotherapists, 66 occupational therapists) from a range of clinical settings (25 acute care, 24 sub-acute rehabilitation care, 3 primary care, 85 community care) with 7 months to 36 years of experience working with stroke survivors completed the survey.

Results
Respondents stated that post-stroke fatigue should be regarded as an important medical condition, because it is common and can be associated with severe symptoms. Symptoms were perceived to be highly variable and the syndrome was difficult to define objectively. It was felt to have both physical and cognitive components. A variety of different opinions were expressed with regard to causation, conceptualisation and best management.

Conclusion
Therapists working with stroke survivors conceptualise and manage post-stroke fatigue in different ways. The first step towards making changes in care pathways is to understand the current clinical setting. Clinical practice is hampered by a lack of a widely adopted definition, and a small evidence base. Research into causes and management of post-stroke fatigue remains a priority.

Do neurological physiotherapists consider executive dysfunctions post-stroke?
A UK survey

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Background
People with stroke can experience deficits in executive functions (EF), such as working memory and attention. Such problems can affect stroke survivors' rehabilitation process, treatment outcomes and quality of life. Interventions, such as cardiorespiratory and resistance training, can improve EF in healthy older people but the effect on people with stroke is less clear.

Cardiorespiratory and resistance training are commonly used in physiotherapy practice to address movement problems and tolerance for activity, but it is not known if physiotherapists are evaluating the impact of this training on EF.

Aims
The aims of this study were to investigate physiotherapists working in neurolog; awareness of EF and its impact on rehabilitation; how they identify and use assessment findings on EF with their patients; and if they are evaluating the effect of cardiorespiratory and resistance training on EF.

Method
Data was collected via an online cross-sectional survey that was circulated to neurological physiotherapist members (n=825) with the Association of Chartered Physiotherapists in Neurology (ACPIN) based on their expert knowledge in working with people who have had a stroke.

Results
Seventy-three participants answered the survey. EF deficits assessment varies between physiotherapists and depends on how they work with other team members. Preliminary analysis suggested that physiotherapists did not use standardised outcome measures to assess EF; nonetheless, they use occupational therapists' assessment data to help design treatment plans. Other physiotherapists did not assess EF and only observed patients' responses to instructions to identify any EF deficits. Finally, cardiorespiratory and resistance training were found to be the main interventions with stroke patients, but EF outcomes were not measured.

Preliminary conclusions
Attention and working memory have clinical impact on functional recovery in stroke survivors and are important for physiotherapists to consider. Moreover, EF deficits were less considered compared to physical impairments in intervention programmes as treatment outcomes.

Standing practice and sit to stand repetitions early after severe stroke
Results from a randomised controlled feasibility trial (SPIRES)

Angie Logan[1], Jennifer Freeman[1], Bride Kent[1], Jillian Pooler[1], Siobhan Creanor[2], Doyo Enki[2], Andrew Barton[1], Jonathan Marsden[1]

Introduction
Standing-up and sit-to-stand repetitions can aid functional recovery post-stroke but this novel combination has not been investigated in people with severe stroke.

Aim
To determine the feasibility of a RCT of a functional standing frame programme during inpatient sub-acute rehabilitation for people with severe stroke.

Method
Assessor-blinded RCT with nested qualitative component and process evaluation.

Participants aged ≥18 years with new diagnosis of severe stroke (modified Rankin Scale (mRS) 4/5) were randomised into either:

- Functional standing frame programme (30min. standing plus sit-to-stand repetitions) plus 15 minutes of usual physiotherapy (Intervention)
- Usual physiotherapy (45 minutes) (Control)

Both minimum five times per week for three weeks.

Feasibility outcomes included recruitment and attrition rates, safety, intervention fidelity, adherence and participants' views on each intervention session. Interviews were conducted with a subset of participants, relatives and physiotherapists to explore experiences of the intervention and trial processes.

Results
Forty-five participants (51-96 years; 42% male, mRS 4=80% 5=20%) were randomised (n=22 intervention). Twenty-seven participants completed the trial. Twelve participants died during the trial.

The most common adverse and serious adverse events were falls and infections, none deemed related to the intervention.

Intervention adherence was low (38-51% sessions completed). Average session duration 39.40min(±8.8). Standing duration 12.52 min.(±8.8). Mean sit-to-stand repetitions 4.64 (±3.9SD) per session. 91% of sessions were enjoyed by participants.

Patient-, physiotherapist- and organisational-related factors, affected recruitment and adherence; for example, organisational culture, beliefs and attitudes of physiotherapists and impact of stroke.

Conclusions
The functional standing frame programme is not feasible in its current design. However, potential solutions have been identified to address a range of challenges including adherence prior to progressing to a clinical and cost-effectiveness trial.

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The effectiveness of non-pharmacological interventions to treat orthostatic hypotension in people with stroke

A systematic review

Angie Logan[1], Jennifer Freeman[1], Jillian Pooler[1], Bridie Kent[1], Hilary Gunn[1], Emma Cork[2], Sarah Billings[3], Jonathan Marsden[1]

Introduction

Orthostatic hypotension (OH) is highly prevalent and can complicate stroke rehabilitation. Potential risk of harm with OH warrants addressing due to risk of further brain damage in acute and sub-acute stroke which may increase disability and mortality. Impact and management of OH during rehabilitation is not included in stroke guidelines.

Systematic review aim

Summarize best-available evidence regarding the effectiveness of non-pharmacological interventions to treat OH in people with stroke.

Method

Database search: English published and unpublished quantitative studies. Critical appraisal conducted by two independent researchers, using standardised instruments from the Joanna Briggs Institute. Where appropriate, studies were included in a meta-analysis.

Results

Forty-three studies (n=1,084 participants), a combination of randomised controlled trials (n=13), quasi-experimental (n=28), case control (n=1) and case report (n=1) met the inclusion criteria. Meta-analysis was conducted for seven studies, concluding that electrical stimulation (two studies), lower limb compression (three studies) and resistance exercise training (two studies) were favourable in treating OH. Although the meta-analysis produced mean effect sizes favouring the intervention, 95% confidence intervals provided inconclusive evidence of an effect, and confidence intervals in resistance exercise training were wide.

Narrative reviews of single studies suggest physical manoeuvres improved OH; sleeping with head-up in combination with pharmacological treatment was more effective than sleeping with head-up alone; eating smaller frequent meals, drinking 480ml of water and abdominal compression increased blood pressure. Lack of efficacy was evidenced for resistance training, but some exercise interventions included in the review improved OH.

Conclusions

Mixed results were found for the effectiveness of non-pharmacological interventions to treat OH in people with stroke. There are several promising non-pharmacological interventions that could be incorporated into and/or outside rehabilitation sessions; however, there is uncertainty about the magnitude of effects.

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The effectiveness of trans-cranial Direct Current Stimulation (tDCS) on lower limb motor dysfunction following a stroke

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Background

tDCS is a non-invasive brain stimulation technique with the potential to increase and direct neuroplasticity so as to significantly improve outcomes of rehabilitation. This function of tDCS piqued the interests of neurological specialists to use it on stroke, a leading cause of disability. However, since its introduction 20 years ago, tDCS research mainly examined upper extremity motor dysfunction. The lower extremity is a more recent focus and less examined. Consequently, a summarised effect of tDCS on lower extremity motor dysfunction surfaced.

Objectives

To assess the effectiveness of tDCS on lower extremity motor dysfunction in stroke. The secondary objectives assessed the impact of phase of stroke and electrode placement on the effect of tDCS.

Method

Cinahl, Medline, AMED and PubMed were searched for articles from January 2009 to July 2019. All studies in which tDCS was the only intervention to treat lower extremity motor dysfunction in adult stroke were included. These studies compared tDCS to no treatment, conventional treatment or sham tDCS.

Results

Nine trials involving 169 stroke patients were included. Eight studies compared real tDCS to sham stimulation while one study compared real tDCS to no tDCS. 75% of the included patients were assessed for function and 45% of them showed a clinically significant increase;. 61% of the included stroke patients were assessed for strength, with 59% of them showing statistically significant improvements.

Conclusions

From this review it is evident that the variations in tDCS parameters, stroke pathology, quality, and methodology of the included studies might have impacted the results. Nonetheless, the effectiveness of tDCS was found to depend on the electrode montage and conventional therapy used. The LLM1-SO electrode montage proved most effective. It is suggested that subsequent research conducted using tDCS for lower extremity dysfunction using this electrode montage would assess tDCS at its best.

The black box of multidisciplinary rehabilitation opened

Using the Northwick Park Therapy Dependency Assessment (NPTDA) to describe therapy intervention in a cohort of patients with complex brain injury in the UK

Stephen Ashford[1,2,3], Lynne Turner-Stokes[1,3], Hilary Rose[1], Barbara Singer[4]

Background

The Northwick Park Therapy Dependency Assessment (NPTDA) is a tool to record therapy intervention in patients undergoing rehabilitation. Ethical approval for use of routine data obtained.

Objectives

- To describe and quantify therapy input for patients undergoing specialist in-patient rehabilitation following complex brain injury in real-life clinical practice.
- To examine the relationship between therapy input and impairment severity, functional independence and rehabilitation complexity.

Method

A cohort analysis (2014-2019, n=286 patients) of prospectively-collected data in a tertiary inpatient rehabilitation programme.

- Recorded at fortnightly intervals, the NPTDA was used to calculate the total delivered therapy hours/discipline and /task area; and also therapy intensity (mean hours/working day).
- Other measures: Neurological Impairment Scale(NIS), UK Functional Assessment Measure(UKFIM+FAM); Patient Categorisation Tool(PCAT); Rehabilitation Complexity Scale(RCS).

Results

Demographics: M:F ratio:63:37%; Mean age: 45.0(sd13) years, Mean length of stay:103(SD49) days; Aetiology: Stroke(63%), Trauma(20%); Hypoxia(7%): Other(10%).

Overall mean (95%CI) total therapy hours for the programme were: 414(390,440); Mean intensity 5.6(5.5,5.7) hours/day.

Mean total hours/discipline: Physiotherapy: 108(104,116); Occupational therapy: 110(103,117); SLT:52(48,58); Psychology; 37(33,41); Social work 33(30,35).

Mean hours/task area: Physical management: 148(138,158); Basic function: 50(45,56); Activities of daily living: 32(29,34); Cognitive/psychosocial 41(37,46); Discharge planning: 79(73,85); Additional activities: 65(60,69).

Entered stepwise in multiple regression analysis, the UKFIM+FAM, NIS, PCAT and RCS all contributed to the model, predicting 33.3% of variance in total therapy time. The FIM+FAM-cognitive scale and RCS predicted just 13% of variance in therapy intensity.

Conclusions

The NPTDA can provide useful information about therapy input, which cannot be gathered by proxy from other standard measures. Rehabilitation intervention, as captured by the NPTDA in a specialised inpatient service, is shown to be multi-dimensional/disciplinary in nature.

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Is focused therapy intervention as measured by the 'Northwick Park Therapy Dependency Assessment (NPTDA)' significantly influenced by the presence of spasticity or contracture?

Stephen Ashford[1,2,3], Hilary Rose[1], Barbara Singer[4], Lynne Turner-Stokes[1]

Background
The Northwick Park Therapy Dependency Assessment(NPTDA) records therapy intervention in patients undergoing rehabilitation. The NPTDA was used to identify treatment for spasticity or contracture. The presence/absence of spasticity or contracture were identified using the Neurological Impairment Set(NIS). Ethical approval for use of routine data was obtained.

Objectives
- To describe and quantify therapy input for patients undergoing in-patient rehabilitation who have spasticity or contracture.
- To examine the relationship between therapy time and the presence of contracture or spasticity, and differences in NPTDA scores in groups with or without these impairments.

Method
A cohort analysis (2012-2019, n=426) of prospectively-collected data in a tertiary inpatient-rehabilitation programme. Recorded at fortnightly intervals, the NPTDA was used to calculate the total delivered therapy hours and / task area; and therapy intensity (mean hours/ working day).

Results
Demographics: M:F ratio:63:37%; Mean age: 44.0(sd13) years, Mean length of stay:103(SD49) days; Aetiology: Stroke(63%), Trauma(20%); Hypoxia(7%): Other(10%).

Overall mean(95%C) total therapy hours for the programme were: 414(390,440); Mean intensity 5.6(5.5,5.7) hours/day.

Mean targeted physical intervention (medical intervention – eg Botulinum toxin injection; orthotics arm/leg; wheehchair seating/positioning and therapeutic practice/intervention) hours/week: without contracture or spasticity: 64(60,68); with spasticity: 81(75,87); with contracture:91(83,101); with contracture and spasticity: 97(84,111). Significant differences were identified for total activity between no spasticity/contracture; spasticity (t=-4.68: p0.000) and contracture (t=-6.8: p0.000) and spasticity/contracture (t=-6.06: p0.000).

Conclusions
The NPTDA can provide useful information about the amount of therapy input specific to management of contracture and spasticity. It was possible in this analysis to quantify the differences in amount of therapy input when spasticity and contracture were present. These data show that the presence of spasticity or contracture correspond to an increase in therapy provision.

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Early rehabilitation of Spinal Cord Injuries
A systematic review

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Introduction
Spinal cord injury (SCI) is a traumatic event requiring specialised rehabilitation. Early rehabilitation is recommended across the NHS for stroke and critical-care services to reduce the risk of secondary conditions eg pressure sores and respiratory complications. Promoting early rehabilitation for SCI patients is supported to optimise functional recovery and improve quality of life although early rehabilitation is not fully recognised in SCI. This systematic review aimed to identify what the existing evidence defines as early rehabilitation for adults with traumatic SCI, including the type of rehabilitation intervention involved within the first five weeks post-injury.

Method
A systematic review was designed in line with CRD guidelines and according to a registered protocol [PROSPERO CRD42018100698]. Key electronic databases were selected [Pubmed, MEDLINE, EMBASE, CINAHL and PEDro]. Pre-defined terms were used, with additional searching of journals and reference lists. Prospective studies of all designs evaluating early rehabilitation in adult SCI patients zero to five weeks post-injury. Two independent reviewers searched information sources, evaluated studies for inclusion, extracted data.

Results
There were747 titles and abstracts selected; 82 full text articles were assessed with six eligible studies, with one at low and five at high risk of bias. Studies (n=551) were conducted in six different countries and published between 1979 and 2017. Sample size ranged n=18 to n=200. Interventions included tilt tabling, active and passive cycling, time out of bed, and mobilisation. Other interventions included chest physiotherapy, passive and active range of movement, focused specifically to contracture prevention. Five different descriptors described early rehabilitation 'explicitly' or 'implicitly'.

Conclusions
This was the first systematic review, to synthesis evidence associated with 'early rehabilitation', within zero to five weeks post-SCI. The quality of evidence was poor although evidence exists specific to early rehabilitation. This review has demonstrated the limited number of studies to support 'early rehabilitation' detailing the nature, scope or timing.

To mobilise or not to mobilise? Early mobilisation after stroke thrombolysis
An exploration of current physiotherapy practice in England and Wales

Nicola Turner[1], Dawn Pickering[2], Karen Jones[2]

Background and aims
Thrombolysis is now a mainstream treatment for ischaemic stroke. The treatment carries known risks yet no specific guidelines exist for early mobilisation (within 24 hours) after thrombolysis. This exploratory study aimed to investigate the experiences and clinical decision-making of physiotherapists in England and Wales regarding early mobilisation after thrombolysis.

Method
A qualitative study with interpretative paradigm, using semi-structured interviews with a purposive sample. Thematic analysis triangulated by participant and researcher review of resultant themes was supported by NVivo software. A reflexive diary was maintained throughout.

Results
Data saturation was reached after 14 interviews. Participants ranged in experience and frequency of exposure to thrombolysis; all reported experience of early mobilisation after thrombolysis, with no reported harm or serious incident. Themes included descriptions of practice and physiotherapists' perceived benefits and harms of early mobilisation after thrombolysis. Current practice was described as cautious with implementation based on specific risk assessment and risk management strategies, with a strong focus on the avoidance of falls.

Conclusions
In the absence of evidence based guidance for early mobilisation after thrombolysis, physiotherapists act autonomously by reducing risk through methods described in this study. Common factors identified for inclusion in a risk assessment prior to early mobilisation after thrombolysis and descriptions of cautious implementation could form the basis of an initial expert opinion guide, contributing to guideline developments to support physiotherapy practice.

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A qualitative exploration of the role of the physiotherapist in the collaborative management of dysphagia in children and young people with cerebral palsy (CYPwCP)

Christie Robinson[1], Dr Lisa Bunn[1], Faye Arnold[2]

For CYPwCP, difficulties associated with feeding and swallowing impact on quality of life and health outcomes. Dysphagia (swallow impairment) is positively correlated with severity of motor impairment. 99% of individuals with severe CP experience dysphagia associated with aspiration and respiratory disease, a major cause of hospitalisation and morbidity. Dysphagia is a potentially modifiable risk with guidance recommending collaborative working to include positioning and postural interventions. Physiotherapists have specialist skills and knowledge, which may contribute to collaborative dysphagia management (DM); however, the extent of involvement or how their role is perceived within management of dysphagia for CYPwCP is unclear.

Using interviews of speech and language (n=3) and physiotherapists (n=8) an Interpretive Phenomenological Analysis (IPA) approach explored the role of the physiotherapist in collaborative DM for CYPwCP.

Three core themes were identified

- The physiotherapy-specific contribution to DM.
- Physiotherapy as part of a team approach.
- Approaches to collaborative working.

A need for shared decision-making and underpinning concepts related to complexity and experience were closely related to the role of the physiotherapist.

This study proposes a physiotherapy role in DM for CYPwCP with more complex physical presentations and health needs. This role predominantly focused on the assessment and management of posture and tone. Physiotherapists also have a role in the assessment, monitoring and management of respiratory function due to the link between dysphagia and aspiration. Physiotherapists provide a supporting role in DM which overlaps with other core members of the team. The extent to which physiotherapists are currently involved in DM is related to external factors such as organisational structure and individual factors related to clinical experience.

There is need for further work to develop consensus, increase intra and inter-professional awareness, provide clinical guidance and establish efficacy of the role of the physiotherapist in DM for CYPwCP.

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Acceptability of Lycra Sleeve for the management of glenohumeral subluxation in people with stroke

Nurses' and therapists' perception

Robert Jones[1], Praveen Kumar[2], Chris Easton[1], Rosemary Greenwood[1], Paul White[2], Ailie Turton[2]

Background

Glenohumeral subluxation (GHS) is a common secondary complication reported in up to 81% of people with strokeand has been associated with pain and poor upper limb function. Lycra garments are lightweight and flexible and compared to rigid orthoses, they are better tolerated, do not restrict movement or encourage disuse. The aim of this study was to explore the acceptability of the Lycra Sleeve as a treatment approach for upper limb impairments and this was part of the feasibility trial.

Method

A questionnaire survey was conducted with nurses, nursing assistants, physiotherapists, physiotherapy assistants and occupational therapists. These staff were involved with treatment of 31 patients recruited for the feasibility trial and included after signing written informed consent. At the start of the trial, staff were provided training on the application of Lycra Sleeve by two researchers. Two separate questionnaires were developed to tailor towards nurses and therapists. Data was analysed using descriptive statistics and the thematic analysis of staff views of Lycra Sleeve.

Results

Nurses (10), nursing assistants (5), physiotherapists (10), physiotherapy assistants (3), and occupational therapists (8) provided feedback. In total 37 responses were received from nurses/assistants and 48 responses from therapy staff. The majority (85%) of staff agreed that the information provided was clear and that putting on and taking off the sleeve was easy. On average, it took a minute and a half to put on the sleeve. Nurses agreed (76%) that the sleeve allowed engagement in daily activities; however, therapists were of the view that there was uncertainty about if the sleeve allowed more engagement in rehab or altered resting alignment of the limb. Therapists were generally unsure (50%) about recommending the sleeve for longer-term use.

Conclusion

The Lycra Sleeve is acceptable treatment; however, clinical effectiveness is required for its application into clinical practice.

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Feasibility of a randomised controlled trial of Lycra Sleeve for glenohumeral subluxation (GHS) in people with stroke

Praveen Kumar[1], Robert Jones[2], Chris Easton[2], Rosemary Greenwood[2], Paul White[1], Ailie Turton[1]

Background

Glenohumeral subluxation (GHS) is a common secondary complication reported in up to 81% of people with stroke. The aim of this study was to evaluate the feasibility of conducting a fully powered randomised controlled trial of the Lycra Sleeve for the management of GHS.

Method

Stroke survivors over 18 years with hemiplegia, muscle strength of ≤3 on Medical Research Council scale, able to provide informed written consent were recruited.

Settings

In-patient rehabilitation. Evaluation points were at baseline and at three months.

Intervention

Patients were randomised to immediate or delayed (received sleeve at three months) groups. Staff, patients and carers received training on application of sleeve.

Outcome measures

Recruitment, retention, adverse events and completeness of data collection were explored at three months. Measurements included: Ultrasound method (GHS), Passive range of movement, muscle strength, Modified Ashworth Scale, upper limb function, Motor assessment scale and EQ5D. A questionnaire explored acceptability.

Analysis

This was conducted using descriptive statistics and thematic analysis of participant's views of Lycra Sleeve.

Results

Over a one year period, the screening process identified 257 stroke survivors of whom 31 (12%) were recruited. N=19 were assigned to immediate group. Overall retention was 27 (87%) and 26 patients tolerated clinical outcome measures. Average days sleeve worn was 50/90 days with a mean time of ten hours/day. Patients in immediate group showed reduction in GHS and improvement in upper limb function but not in delayed group. The majority of participants (n=25) reported no adverse reaction. Patients (67%) reported that putting on sleeve was easy and 100% found it comfortable to wear. The majority (96%) patients reported Lycra sleeve was acceptable in their daily lives.

Conclusion

Recruitment was low but retention was good. This study found that a subsequent clinical trial was feasible;, however, modifications to the recruitment strategy are required.

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Finding consensus in neurological physiotherapy education in Austria

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Background
Quality assurance is very important in tertiary education. In Austria there are eleven universities of applied sciences that teach neurological physiotherapy. Despite the published European Qualification Framework (EQF) (2008) and the competency profile of Physio Austria (Austrian Association of Physiotherapists) for physiotherapists describing learning outcomes of EQF level-6, a shared vision for the field of physiotherapy in neurology is missing.

Purpose
The aim of this paper was to define shared specifics of learning outcomes for the field of neurology for undergraduate physiotherapy students.

Method
Ten Austrian Universities of Applied Sciences participated in twelve consensus meetings: five to understand the competence profile in depth; five to define neurological specifics of learning outcomes, for the EQF level-6, in smaller groups; two for incorporating feedback and edits.

Results
Consensus was reached and neurological specifics of learning outcomes within the following roles were developed: Expert in Physiotherapy, Communicator, Teamworker, Health Promoter, Innovator, Health Professional. With regard to neurological specifics most expertise and discussions in the group focused on the role: Expert in Physiotherapy. A similar amount of time was spent on the discussion of the roles of Communicator, Teamworker, Health Promoter, Innovator, Health Professional. No neurological specifics had been added to the role of manager.

Conclusion
The neurological specifics of learning outcomes developed here can be used as a basis for a uniform, content-related orientation in teaching at Austrian universities of applied sciences. This promotes a better comparability of educational standards in the physiotherapeutic field of neurology in the European as well as in the international field and is of great interest for the profession of physiotherapist. Finally, the disclosure of the consensus-building process provides a transparent and comprehensible background to what might be of great interest to other university network groups and other professions.

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Activity monitors to promote physical activity on an acute stroke unit
Qualitative results of a feasibility study

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Introduction
Physical activity (PA) is low in patients in hospital following stroke. Activity monitors have been used to measure amount of activity. As there is some evidence to support their use in increasing activity, this study examined the feasibility of using them to provide activity feedback on an acute stroke unit and to whom the feedback should be given. If feasible we would then test whether feedback promotes activity.

Method
Participants who were able to stand were recruited between six and 25 days post stroke, and randomly allocated to a patient feedback (PF) or staff feedback (SF) group. Participants wore an activity monitor from 8.00am to 5.00pm for seven days, and data were downloaded daily. The PF group received data feedback directly and were given suggestions to increase PA. In the SF group, data were given to nursing and therapy staff who were asked to give participants suggestions for increasing PA. Views on the monitors and levels of PA were recorded from participants and staff through interviews and focus groups which were analysed thematically.

Results
Sixteen participants were recruited; three completed data collection. Monitors were accepted by participants. PA was low in all participants. Analysis of patient and staff views regarding the monitors revealed four themes: lack of awareness of activity, need for motivation regarding activity, impact of ward routine and culture, and lack of patient autonomy in the ward environment.

Conclusion
Patients are inactive in hospital following stroke. This may be due to factors within the ward environment limiting awareness of activity and reducing opportunities for staff and patients to motivate an increase in physical activity.

Return to employment after stroke in young adults
Metabolic cost of walking

Claire Butterworth[1], Neil Reeves[2], Steven Brown[2], Nia Rees[3], Louisa Walker[3], Abigail Clayton[4], Renee Groenevelt[5], Karl Jackson[6], Hannah Jarvis[2]

Background
One in ten people who experience a stroke are a young adult (defined as adults under the age of 65 years). Many young adults who have had a stroke describe considerable difficulty walking and completing activities of daily living and most are unable to return to employment. We recently reported that only 23% of young adults returned to work following a stroke and if an individual walks slower than 0.93m/s they are less likely to return to work. Young adults who have had a stroke may walk slower because they are less efficient at walking.

Aims
The aim of this study is to compare metabolic energy expenditure and metabolic cost of young adults who have had a stroke who walk slower than 0.93m/s to those who walk faster than 0.93m/s.

Method
Participants who had experienced a stroke (n=46) and controls (n=15) were recruited from six health boards in Wales, UK. Type, location and cause of stroke, occupation and smoking status were recorded. Walking performance was measured using three-dimensional gait analysis and energy cost through measurement of energy expenditure during three minutes of walking.

Results
Stroke participants who walked slower than 0.93m/s had a greater metabolic cost of walking (0.35ml/kg/m (SD=0.15) than participants who walked faster than 0.93m/s (0.16ml/kg/m (0.02) or the control (0.15ml/kg/m (0.01), $p = 0.028$). Metabolic cost was similar between participants who walked faster than 0.93m/s and the control. Metabolic energy expenditure was similar across groups ($p = 0.067$).

Conclusions
Young adults who have had a stroke and walk slower than 0.93m/s have a significantly greater metabolic cost, or are much less efficient at walking. Rehabilitation should be aimed at increasing walking speed and reducing energy cost to improve potential to return to work.

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The use of accelerometers in determining risk of fall in individuals post stroke

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Purpose
Individuals post stroke experience a multitude of disease related deficits placing them at increased risk of fall. Physical therapists (PTs) must prioritise fall assessment during the evaluative process, although the precise combination of measures resulting in accurate prediction of falls remains unknown. Accelerometry has been useful in predicting falls in older adults but has yet to be utilised in individuals post stroke. Therefore, the purpose of this study was to determine if the use of accelerometers during the Timed Up and Go (TUG) and Five Times Sit to Stand (FTSS) tests enhanced clinicians' prediction of fall in stroke survivors.

Method
- Inclusion criteria: stroke ≤ four months, ambulatory, follow commands, and perform ADLs.
- Exclusion criteria: unstable vitals/pacemaker, hospitalisation ≤ 30 days, or history of neurologic conditions.

Ten subjects (61.8 years old +/- 2.8, 90% male) participated in the study. Four standardised outcome measures were implemented: TUG, FTSS, Falls Efficacy Scale (FES), and gait analysis. Evidence-based cut-off scores were utilised to predict fall risk. Subjects wore accelerometers on the chest and both thighs interchangeably during the TUG and FTSS. Subjects were instructed to maintain a falls log for six months.

Discussion
No relationship was noted between reported falls and cut-off scores for the TUG, FTSS, and gait speed. However, the FES had a specificity and positive predictive value of 100% in predicting fall. Further analysis revealed that all fallers had increased variability in stance time as compared to non-fallers. Regression analysis of all independent variables were inconclusive. These findings suggest PTs should use caution when determining fall risk based solely upon cut-off scores on standardised tests, and self-efficacy outcome measures are an important component of assessment. Stance phase variability warrants further investigation to understand the relationship between movement asymmetry and falls. Future studies should be inclusive of a larger sample size.

The views and perspectives of adults with cerebral palsy about physiotherapy services in the UK and Ireland

Cherry Kilbride[1], Gemma Cook[1], Jennifer Ryan[1,2], Manjula Manikandan[2], Claire Kerr[3], Aisling Walsh[3], Elizabeth Cassidy[4]

Introduction
Adults with cerebral palsy (CP) experience musculoskeletal pain, reduced balance, declines in mobility and fatigue. As a result, they are likely to require physiotherapy. However, qualitative studies suggest that young adults with CP experience difficulties accessing physiotherapy once discharged from children's services. This study aims to investigate the views of adults with CP about physiotherapy services in the UK and Ireland, including reasons for accessing physiotherapy, how they access physiotherapy, and satisfaction with physiotherapy.

Method
A cross-sectional online survey was employed. Data collected included personal information, mobility, pain, general health, access to content and experiences of physiotherapy services, and access to other healthcare professionals. Descriptive analysis was conducted.

Results
Participants (n=114) were aged 18-74 years. The majority were female (81%), lived in England (66%) and were classified as GMFCS level I (9%), II (36%), III (27%), IV (16%) and V (10%). Ninety per cent of participants reported a need for physiotherapy but only 33% received physiotherapy services. Reasons for physiotherapy visits included general advice (26%) and stiffness (19%). Participants reported access (43%) and referral (37%) to specialist physiotherapy services difficult. Additionally, participants were not satisfied with the availability (69%) and quality (51%) of physiotherapy services.

Conclusion
Although the majority of adults reporting needing physiotherapy, over half of these people did not receive the physiotherapy that they needed and had a lack of satisfaction with these services. The study findings can inform the development of physiotherapy services for adults with CP.

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The direct orthotic effect of FES on gait kinematics and walking speed in people with MS under dual-tasking and fatiguing walking conditions

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Background
One of the benefits of FES as reported by people with multiple sclerosis (pwMS) themselves is that it reduces the mental effort of walking, as less concentration is needed on the walking task. Several studies have indicated that pwMS exhibit gait deterioration while performing a cognitive task together with a walking task. Although many studies have investigated dual-tasking in pwMS, the influence of FES on the dual-task cost (DTC) and the orthotic effect of FES have not been explored. The aim of this pilot study was to investigate the effect of FES under conditions that simulate activities of daily living.

Method
Seven pwMS (five females; mean age: 54.1yrs; EDSS: 4-6) and five healthy individuals (four females; mean age: 55.0yrs) volunteered to participate. Gait kinematics and spatiotemporal parameters were recorded via 3D motion analysis in three different conditions: A) single-task walking (FES on&off), B) dual-task walking (FES on&off) and C) dual-task walking after induced fatigability (FES on&off). The Stroop test was used as the cognitive task for the dual-task conditions and an incremental shuttle walk test to induce fatigability.

Results
Walking with the assistance of FES resulted in an improvement in all gait parameters and especially the peak dorsiflexion (DF) in swing. There was a small trend towards a higher direct orthotic effect on DF in swing during dual-task conditions (B and C) compared to single-task (A) (ES Task A vs Task B=0.12, ES Task A vs Task C=0.10). The DTC of walking speed was higher in MS (12.4%) compared to the healthy group (4.6%).

Conclusion
This was the first study to investigate the benefits of FES under dual-tasking and fatiguing conditions in pwMS. The findings suggest a small positive trend for the direct orthotic effect of FES under dual-task compared to single-task conditions. Further investigation with a bigger sample size is required to confirm these findings.

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A qualitative exploration of the impacts of two linked community-based exercise interventions after stroke

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Background
After a stroke people often find it difficult to start or re-engage with different forms of exercise and physical activity (PA). In Lothian, Scotland, people who are ambulant are referred into the 'Exercise after Stroke' pathway (EAS) which supports community-based PA. More recently, an intervention called 'In Reach' (IR) was piloted to provide transitional support through guidance from an exercise professional within the hospital, soon after stroke. Funding was granted from the Edinburgh and Lothians Health Foundation for a qualitative exploration of engagement with PA by people who experienced either, or both, of these interventions.

Method
A phenomenological approach used individual, face-to-face, semi-structured interviews with people who had experienced EAS and/or IR services. Interviews were conducted in participants' homes and lasted 28-65 minutes. These were audio-recorded, transcribed verbatim, and thematically analysed using Interpretative Phenomenological Analysis. Ethical approval was given by an NHS regional ethics committee.

Results
Nine participants consented and were interviewed; four attended EAS and IR, with five experiencing only EAS (three women; six men; mean 2.4y post-stroke, SD 1 year). Key themes suggested that EAS and IR have potential to support gym-based community exercise but also impact positively on other forms of PA participation. This helped reduce the impacts of stroke, and impacted positively on life roles, social participation and ultimately quality of life. There was a difference in people's inner resources and approach to life, eg ability to plan ahead and overcome barriers, which showed links with people's choices in relation to continuing to participate in community-based exercise and/or PA.

Conclusion
Our analysis supported the value of EAS and IR; we developed a theory to explain our data which could inform improvements to the interventions through a greater focus on empowerment, also adding to discussion about greater emphasis on designing holistic interventions.

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Evaluating occupational therapists (OTs) competence to deliver a complex vocational rehabilitation intervention in the RETurn to work After stroKE (RETAKE) trial

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Background
Rehabilitation trials are challenging and unpredictability of results increases as interventions become more complex. Assessing implementation fidelity of trial interventions helps in interpreting effectiveness outcomes. Implementation fidelity may be undermined by OTs' competence; yet, this is rarely reported in trials of complex interventions.

Aim
To determine OTs' competence to deliver Early Stroke Specific Vocational Rehabilitation (VR) in RETAKE, a 25-centre definitive RCT, testing early post-stroke VR effectiveness (HTA approval HTA 15/130/11; Ethics 18/EM/00).

Method
OTs attended a two-day, manualised face-to-face training with VR expert trainer/mentors, plus refresher training at six months. Monthly peer-mentoring was facilitated by mentors. Vignettes depicting novel return-to-work after stroke scenarios with model answers were developed by the training team and used to assess competence at both time points using criteria based on knowledge of the intervention process (40%), clinical reasoning (50%) and written communication (10%). Scores were mapped to a rubric identifying OTs as highly competent (≥70%), competent (50-69%) or needing additional support (≤49%).

Results
Twenty-two OTs were assessed. At initial training five needed additional support, 15 were competent, 1 highly competent. Following refresher training all five needing additional support were rated 'competent', none needed additional mentoring; 14 were highly competent.

Vignettes are used to measure competence in healthcare training but rarely used in trials. All but one OT improved competency with experience of intervention delivery and mentoring. The OT who did not improve had no opportunity to deliver the intervention due to recruitment issues. The findings will determine the relationship between therapist competency, intervention fidelity and participant outcomes.

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An investigation of anticipatory postural adjustments under highly controlled arm-reaching conditions in a standing position with healthy adults

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Background and purpose
Successful function in standing is dependent on the efficiency of postural mechanisms to anticipate disturbance from an intended movement. Experimental models investigating motor mechanisms defined as anticipatory postural adjustments (APA), have traditionally incorporated large, fast arm movements to confidently generate the associated activity. However, with the impact of deteriorating postural mechanisms on quality of life, and healthcare costs predicted to escalate with an ageing population, the purpose of this research was to determine whether APA could be characterised under highly controlled arm-reaching conditions in healthy adults.

Method
A cross-sectional experimental model incorporating robot arm equipment (Inmotion2, IMT, Cambridge, MA, USA) was designed for use in a standing position. Thirty healthy subjects (range 21-42 years) participated in the ethically approved research, which involved a self-generated, visually cued arm-reaching task to four trajectories of reach. Adaptations included external trunk support and resistance through arm movement to the target. Lower limb muscle responses were recorded using electromyography (EMG) and synchronised with arm movement data collated from the robot computer. Responses were analysed using multi factorial analysis of variance (ANOVA).

Results
APA were identified in all subjects and were consistent in response between subjects for all conditions of reach. Moderating influences were task specific to the phase of APA generated (inhibitory or active), the trajectory of reach and the selected muscle tested. Trunk support significantly ($p<0.001$) reduced the magnitude and frequency of inhibitory response. Arm reach with resistance significantly ($p<0.001$) augmented the magnitude of active APA.

Conclusion
The generation of distal lower limb muscle APA under highly controlled conditions of self-generated arm movement in a standing position has provided comparable data for future clinical investigation. Conditions are more applicable to a balance-vulnerable population than previous methods of APA investigation.

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'Better Balance' a multicomponent falls prevention intervention for multiple sclerosis

Proof of concept testing and initial findings

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Purpose
This study presents the proof of concept testing of a multicomponent falls prevention intervention for people with multiple sclerosis: 'Better Balance'.

Design
Proof of concept study with a qualitative process evaluation. A 12-week multicomponent intervention consisting of supervised exercise, group coaching and home exercise sessions.

Materials and method
Primary outcomes were feasibility measures (recruitment, retention, protocol adherence, adverse event rates) and falls incidence (prospective falls diaries). Secondary outcomes included known risk factors for falls. A qualitative process evaluation was conducted after intervention completion.

Results
Seven participants were enrolled. Recruitment (31.8%), retention (71.4%), protocol adherence (85%) and adverse events (0%) were encouraging. Falls incidence reduced during the twelve-week intervention period but was not maintained during the follow-up. Results of the secondary outcomes were promising for balance (14.86±4.85 to 20.14±6.31), participation (23.29±17.62 to 17.86±18.18), self-report walking ability (40.0±13.39 to 32.86±13.53) and psychosocial factors. The qualitative process evaluation revealed positive results for the acceptance and usability of the intervention and informed necessary modifications.

Conclusions
Preliminary results suggest 'Better Balance' is feasible to implement, is well received and demonstrates promise in achieving targeted outcomes. The results also indicate the nature and scope of modifications needed prior to undertaking a larger pilot trial.

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What do therapists do when they have more time to treat the upper limb?

A qualitative study

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Introduction
A greater intensity of therapy provides better outcomes for the upper limb after stroke. However, in the UK therapists report treating the upper limb for only 28 minutes, three times a week whilst observational studies suggest the upper limb may be the focus of treatment for as little as four minutes in every treatment session. Conversely, in a recent trial, therapists delivered upper limb therapy for two one-hour-long sessions a day, five days a week for three weeks for people after stroke. The aim of the current study was to explore the experiences and observations of the therapists who offered this intensive therapy.

Method
Therapists who had delivered the intervention at a single hospital (Johns Hopkins Hospital, USA) participated in a focus group conducted via video link between the therapists and two researchers from the UK (RCS and DC). After transcription, themes were analysed independently by DC and RS and then agreed. Linked sub themes were collated to form larger themes which were sent to participants for verification.

Results
Four therapists (three females, two occupational therapists and two physiotherapists) participated in the focus group. Three overarching themes were identified:

- Freedom – more time for treatment allowed more flexibility in treatment.
- Implementation – there were some initial concerns about providing more intense therapy in this patient group but these were largely unfounded.
- Legacy –this experience altered the emphasis placed on the upper limb in usual practice after the trial.

Discussion and conclusions
Providing more time for rehabilitation of the upper limb after stroke enabled therapists to focus less on teaching compensations to facilitate imminent discharge, towards a greater focus on remediation of impairments. These changes were reported to continue into usual practice after participation in the trial, with an increased urgency and prioritisation of the upper-limb.

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The effects of FES cycling combined with virtual reality (VR) racing biofeedback on voluntary function after incomplete SCI

A pilot study

Sue Paddison[1], Lynsey Duffell[2], Nick Donaldson[2], Jane Burridge[3]

Background
Optimising functional recovery and mobility following SCI is of personal and economic importance. Movement repetition contributes to neural reorganisation and VR biofeedback has been shown to enhance motor learning. Greater neuroplastic effects are anticipated by combining two stimulation sources but this has not been investigated.

Aim
Investigate whether a one-month training programme using a novel device, the iCycle, could enhance neurological recovery of incomplete SCI individuals.

Method
Eleven participants (C1-T12) with incomplete SCI (five sub-acute; six chronic) were recruited (age range 21-80, 9 were >50 years) and completed twelve sessions of iCycle training. Assessments before and after training, and one-month post-intervention, were International Standards for Neurological Classification (ISNCSCI) motor score, Oxford power grading, Modified Ashworth Score, Spinal Cord Independence Measure, the Walking Index for Spinal Cord Injury and 10 m-walk test. Power output (PO) and patient feedback was recorded during all training sessions. Statistical correlations were carried out.

Results
Median (IQR) improvements in motor scores were 3.5 (6.8) points for participants with chronic SCI, and 8.0 (6.0) points for those with sub-acute SCI. Improvements were unrelated to other measured variables ($p>0.05$). Five out of eleven participants showed moderate improvements in PO; this did not correlate with neurological recovery. Improvement in PO during cycling was positively correlated with baseline voluntary PO ($R2=0.50$; $p<0.05$), but was unrelated to all other variables ($p>0.05$). Spasticity reduced or unchanged for all, one demonstrating significant improvement.

Conclusion
Improved motor scores in chronic participants may be attributable to the iCycle training. Recovery in sub-acute participants could not be distinguished from early spontaneous recovery. Some participants were keen to continue despite not demonstrating motor improvement. The iCycle is an innovative progression from existing FES cycling systems, and positive results should be verified in an adequately powered controlled trial.

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Time spent in rehabilitation and effect on measures of activity after stroke

A systematic review, using Cochrane Methods

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Background

The Royal College of Physicians recommend that stroke survivors should receive 45 minutes of daily physiotherapy following a stroke. This is a consensus-based recommendation, made in the absence of strong evidence that 45 minutes physiotherapy daily will optimise outcomes. To date, meta-analyses undertaken in this area report conflicting results. All have included studies in which the intervention groups differed in the type of rehabilitation provided, as well as the amount.

Method

Following publication of the proposed methodology, a systematic review and meta-analysis of RCTs (using Cochrane Methods) was undertaken. Included studies compared two or more treatment arms that received the same intervention, but in different 'amounts'. Outcome measures of interest were activities of daily living measures, upper and lower limb activity and impairment and serious adverse events/death.

Results

Twenty studies met the criteria. With the exception of upper limb impairment, more time spent in rehabilitation did not have a significant effect on outcomes. When comparing studies with a greater vs. smaller difference in amount of rehabilitation between intervention arms, greater improvements were found for studies with a greater difference. Scatter diagrams comparing difference in amount of rehabilitation to outcomes tentatively suggest a relationship between the two, but these findings are limited by a small number of data points.

Discussion/conclusions

Findings suggest that more time spent in rehabilitation does not necessarily result in improved outcomes, particularly if the amount of time does not exceed a currently unknown threshold. However, these findings are limited by the number and size of studies that met the criteria. In addition, the studies varied in the type of rehabilitation provided (between studies, if not within them), which may also influence outcomes. A large RCT comparing different amounts of the same type of therapy may assist in understanding the effect of time spent in rehabilitation.

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Balance re-education in stroke and head injury patients using SoleSense audiovisual feedback

A pilot study

Caz Icke
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Background

Sensory loss following central nervous system damage can negatively impact balance, thereby affecting standing and walking. SoleSense is an innovative rehabilitation tool being developed to address this. Pressure-sensing shoe insoles detect the centre of pressure changes within a patient's base of support. Real-time audio-visual feedback is delivered on screen and via headphones, substituting vision and sound for lost sensation. This low-cost technology has the potential to improve sensory augmentation, increase independent and repetitive practice and provide fast and accurate balance and gait outcome measurement.

Aims

This pilot study will investigate the use and acceptability of SoleSense for retraining balance in a small group of patients. It will also collect valuable patient feedback for onward product development and assist the design of future proof-of-concept studies.

Method

A non-controlled experimental study involving ten patients less than six months post stroke or head injury will take place over two sites. A single session of assessment will be carried out: baseline and intervention measurements of Centre of Pressure excursion, BERG balance score, Timed Unsupported Stand and Clinical Test for Sensory Integration of Balance. A questionnaire exploring each participant's perceptions of the device will be completed at the end of the session. A Visual Analogue Scale will evaluate how useful patients feel this type of rehabilitation tool is.

Analysis Plan

- Descriptive statistical analysis.
- Unpaired t-test for differences between baseline and intervention measures for each outcome variable.
- Statistical significance will be set at $P<0.05$.
- Identification and analysis of themes from Questionnaire feedback.

Next steps

Further product development will take place following exploration of patient perceptions and feedback. Further proof of concept studies will be designed in accordance with the current pilot data.

The impact of a family education and support group for families of stroke survivors

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Background

Patients' family members expressed concerns about their lack of knowledge in understanding causes and types of stroke and impact on their loved one's future. A literature review identified little in the way of a family educational support programme (Forster *et al* 2012); however, high levels of anxiety, depression and stress in families post stroke (Ellis *et al* 2010, Legg *et al* 2011) were noted. To address this, a family education package was developed and delivered by therapy staff whilst their relative was an inpatient.

Method

Between June 2018 and May 2019, data was collected for the Family Education and Support Group (FEG), a fortnightly group run for relatives and friends of stroke survivors.

Attendees completed pre and post session questionnaires regarding their levels of knowledge about specific stroke related topics (Knowledge) and Quality (information/presentation/facilitators).

Results

During the first year 144 people (125 families) attended sessions. On average, seven people in each group representing six families attended each session. All 15 domains of knowledge scores improved; 'recognising stress and anxiety in themselves' showing the lowest increase (32%) and 'how to access services and seek further information' showing the highest increase (53%). Qualitative family feedback was examined, identifying families wanted more time addressing 'practical considerations in the community'. The practical realities and benefits of running such groups for clinicians and relatives are also discussed. The questionnaires need some refinement for analytical purposes.

Discussion/conclusion

FEG aims to answer many of the questions family members have regarding what a stroke is, what may have caused it (risk factors section), how can we rehabilitate and what happens next (managing with stroke in the community section). Furthermore we address the impact it may have on family and friends and look at understanding and recognizing stress, coping mechanisms and support networks in this population. Future plans for a longitudinal project are briefly discussed to identify if there are longer term benefits to stroke survivors and their relatives.

Service evaluation

Being prescribed therapy-based exercise from the perspective of adult patients

A qualitative systematic review conducted using an ethnographic approach

Sally Davenport[1], Angela Dickinson[2], Catherine Minns Lowe[2]

Background
Rehabilitation requires the engagement of patients and often their family or carers in the process to be effective. For this, patients frequently need to practise skills by themselves, but many fail to meet recommended levels of therapy-based exercise. Patients who struggle to access, understand or remember healthcare advice are less likely to follow recommended treatment programmes. This review therefore aimed to explore how adult patients view being prescribed therapy-based exercise, the information/education they are given and receive, and if/how they independently practise and adhere.

Design
A qualitative systematic review conducted using an ethnographic approach.

Sources
PubMed, CINAHL, SCOPUS, EMBASE databases (dates: 01/01/2000-31/12/2018).

Method
Qualitative studies with a focus upon engagement/adherence with therapy-based exercise were included. Data extraction and quality appraisal were undertaken by two reviewers. Results were discussed and data synthesised.

Results
20,294 titles were screened, data was extracted from 39 full texts and 18 papers were used to construct three themes. 'The Guidance received' suggests that the type of delivery desired to support and sustain engagement was context-dependent and individually situated. 'The Therapist as teacher' advocates that patients see independent therapy-based exercise as a shared activity and value caring, kind and professional qualities in their therapist. 'The Person as learner' proposes that when having to engage with and practise therapy-based exercise because of ill health, patients often see themselves as new learners who experience fear and uncertainty about what to do. Patients may have unacknowledged ambivalences about learning that impact on engagement and persistence.

Conclusions
The nature and quality of the interaction between therapists and patients appears integral to patients engaging with, and sustaining practice of, rehabilitation programmes. Programmes need to be individualised and health care professionals need to take into account both patients' previous experiences of therapy and exercise, and their ambivalences in motivation, learning uncertainty and sense of empowerment and ownership.

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Mechanical insufflation-exsufflation for the prevention and treatment of respiratory complications in acute cervical spinal cord injury

A retrospective analysis

Debbie Hubbard[1,2,3], Claire Fitzgerald[1], Ema Swingwood[4]

Background
A cervical spinal cord injury (CSCI) is a life-changing event resulting in neurological weakness. Acutely, respiratory complications are the leading cause of mortality. Mechanical insufflation-exsufflation (MI-E) is a positive pressure device used to augment cough and promote airway clearance in the prevention and treatment of respiratory complications in this population. The incidence of respiratory complications in patients with CSCI who receive MI-E is not widely reported.

Aims
To report on the incidence of respiratory complications, and to evaluate the clinical application of MI-E in patients with acute traumatic CSCI.

Method
This was a retrospective case note review of patients with acute traumatic CSCI admitted to a UK major trauma centre between January 2017 and September 2018. Incidence of respiratory complications on admission and fourteen days post-discontinuation of MI-E were recorded, as well as detail relating to MI-E clinical application, were used.

Results
Thirty-three patients were included. Overall incidence of respiratory complications was 21.1%. There was no difference in rates of respiratory complications between those who received prophylactic MI-E and those who did not (p=0.23). There was a significant difference in the clinical application of therapeutic MI-E compared to prophylactic MI-E, with those receiving therapeutic treatment more frequently (p=0.01) and with higher exsufflation pressures (p=0.003).

Conclusion
The findings of this review suggest that MI-E provides no additional benefit in prophylactic management of respiratory complications following acute traumatic CSCI. However, this result may be confounded by a small sample size. Further incidence reporting of larger samples including those with thoracic injuries is warranted.

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Therapy timetabling

An evaluation of outcomes following implementation at the Oxfordshire Stroke Rehabilitation Unit

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Introduction

The Oxfordshire Stroke Rehabilitation Unit (OSRU) provides short-term inpatient rehabilitation for patients following acute stroke. Intensive rehabilitative interventions improve functional outcomes but, despite this, patients are often described to be 'inactive and alone' in hospital. Historically OSRU struggled to achieve the recommended 45 minutes per therapy, five days a week, as described in the *National Clinical Guideline*. The ReAcT study reported the positive effects of therapy timetabling on patient engagement, caseload prioritisation and minutes of therapy provided.

Method

A multidisciplinary timetabling format was developed, and a weekly timetabling meeting was instigated. A standard operating procedure was written and circulated amongst staff, with additional 1:1 training provided as required. Weekly timetabling was implemented from the beginning of June 2018. Five months pre and post data was analysed to evaluate the impact on therapy provision and patient outcomes.

Results

- Occupational therapy (OT) and physiotherapy increased average number of minutes per session to 51 and 47 respectively.
- % of days on which OT received during admission increased from 44.6% average to 66.2%.
- % of days on which physiotherapy received during admission increased from 56.4% average to 70%.
- Average change on the Barthel Index increased from 4.01 to 5.06.

Conclusions

Findings support the observations from ReAcT and demonstrate the positive impact of weekly timetabling on therapy provision, and potentially patient outcomes. OT and physiotherapy increased both the percentage of days on which patients received therapy and the number of minutes per session. It is hoped these findings will generate discussion and inspire other rehabilitation units to consider therapy timetabling.

Cardiorespiratory fitness after stroke

A service evaluation at the Oxford Centre for Enablement

Emma Dodds[1,2], Eleanor Douglas[2]

Background

Cardiorespiratory fitness deteriorates after stroke through physical inactivity, neurological impairments and co-morbidities. Clinical guidelines for stroke recommend aerobic exercise during rehabilitation to improve fitness and function and to reduce stroke recurrence.

Aims

- To evaluate the provision of aerobic exercise programmes on patient outcomes after stroke at a Level 1a inpatient rehabilitation service.
- To evaluate aerobic exercise programmes from patient perspectives.

Method

Service evaluation using convenience sampling. Inclusion criteria: diagnosis of stroke, ambulant and non-ambulant inpatients, able to use exercise equipment, with or without assistance. Exclusion criteria: inability to follow an exercise programme due to severe physical, cognitive or communication impairments. Primary outcomes were tested on admission (or when ambulant) and discharge: aerobic capacity (6-minute walk test), walking speed (10-metre walk test). Exercise intensity (Borg RPE 6-20) was recorded after every exercise session. Patients' exercise preferences, motivators and barriers to exercise, and satisfaction with the programme, were captured on discharge using a bespoke questionnaire. Patients exercised three to five times per week, 20 minutes per session, at a moderate intensity (Borg 11-14).

Results

Ten patients met the eligibility criteria. Cycling was the most common method of aerobic exercise. In total, 88% patients improved their aerobic capacity (6MWT) and 77% their walking speed (10 MWT) more than the minimal clinically important difference for stroke (34.4m; 0.16m/sec respectively). Overall 80% patients completed the questionnaire and were satisfied with the exercise programme delivery. Patients indicated a preference for supervised group sessions and reported reasons for exercise were to improve strength and mobility. Fatigue, pain and a fear of falling were reported as barriers to exercise.

Conclusions

Aerobic exercise delivered in a group setting, tailored to individuals' needs, improves aerobic capacity and walking speed. It meets patients' satisfaction and is safe and practical in an inpatient setting. However, provision of exercise at an optimal frequency, duration and intensity still needs to be researched.

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Values based approach to goal setting in neurorehabilitation

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Background

The aim of this service development initiative was to develop a goal setting structure that both adhered to national guidelines while at the same time served to promote true interdisciplinary goal focused rehabilitation; improve patient motivation; and make rehabilitation more meaningful and of personal value.

Method

Evaluation of goal-setting structure currently in place on Level 1 complex rehabilitation unit. Review of literature surrounding goal setting in neuro rehabilitation, with a focus on person-centred rehabilitation and identity mapping. Restructuring of MDT meetings to embed greater discussion and focus on patients goals. Development and implementation of a patient values Checklist and patient-friendly goal-setting paperwork to support the setting of patient centred goals. IDT training sessions covering both the research and practical application of goal setting. Audit of goals setting against national and new organisational guidelines, and staff and service user surveys.

Findings

Results of our audit suggest significantly increased interdisciplinary goal setting and goal focused rehabilitation: goals are more patient centred and individual reflecting patient roles and values; significantly increased accessibility of goals to patients and their families. Themes derived from our service user and staff surveys suggest increased patient and family's awareness of their goals, and an increased understanding of the goal-setting process from both staff and service users.

Discussion

The complex presentations of patients on Level 1 Rehabilitation units makes effective patient-centred goal setting difficult to implement and a timely process. Often leading to: uni-professional goals that do not reflect individual patient values or motivators; a focus on decreasing care needs rather than improving quality of life; poor accessibility to patients or their families. Results of our audit suggests that the new values based approach has allowed greater patient involvement and awareness of their goals, while at the same time promoting truly interdisciplinary rehabilitation.

Evaluating a year of PDActiv8

High intensity, large amplitude group exercise in early stage Parkinson's Disease (PD). Does it serve the patients and the service?

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Background

Large amplitude, high intensity exercise is proven to improve motor symptoms in Parkinson's Disease (McDonnell *et al* 2018). Such exercise needs to be diligently maintained long-term and is most beneficial if delivered in a group setting providing peer support, education and motivation. Our existing six-week exercise course provided a six month follow up, but inadvertently excluded working patients and showed long-term adherence to exercise faltered.

Aim

To establish a monthly large amplitude, high intensity exercise class, accessible to those with early stage PD, and to review its effectiveness after one year.

Method

A monthly circuit class, PDActiv8, was offered in the evening to those with early stage PD (Hoehn & Yahr < 2). All patients were screened for suitability for exercise (PAR-Q) and provided with a home programme based on the same exercises as those being used in the class. The nine-hole peg test and PDQ-39 were used as objective markers. Demographics, attendance and outcome measures were taken at twelve months for those who had attended more than half the sessions. All patients were offered an online survey to feed back, and three patients were then randomly selected for in-depth interviews.

Results

PDActiv8 grew from six to a total of 20 patients with early stage PD (average H&Y 1.2). Although there was a mild deterioration in PDQ-39 scores, there was no change in nine-hole peg test scores. Qualitative feedback was overwhelmingly positive with improved exercise adherence.

Conclusion

PDActiv8 has provided exercise support for patients previously not served by any other local options and has proved very popular. In progressive conditions an improvement in motor outcome measures would not be expected, therefore the significance of positive qualitative feedback is more pertinent. Patients have engaged with PDActiv8, boosting their motivation for their existing exercise regimes and long-term adherence.

Improving the treatment of patients presenting with vertigo to accident and emergency (A&E)

A scoping exercise

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Background

Symptoms of vertigo within the general population are common and undertreated:

- Almost 1 in 4 adults under 65 report dizziness or vertigo.
- Less than 25% had received treatment (Collerton *et al* 2012).
- About 20% of people with vestibular vertigo avoid leaving the house and 41% require sick leave (Neuhauser *et al* 2008).
- Incidence of BPPV in the general population is 2.4 % lifetime prevalence, only 8% receiving effective treatment (von Brevern *et al* 2007).
- 80% of unexplained fallers attending A&E had possible vestibular loss (Tian *et al* 2013).
- Fallers use more than four million bed-days and cost the NHS £2.3 billion (Tian *et al* 2013).
- Evidence suggests an association between anxiety and recovery. Better education may have a positive impact on prognosis (Stabb *et al* 2017).
- Early treatment is thought to be optimal due to the timeframe of neurogenesis; however, patients are rarely seen in this timeframe (Lacour 2016).

The purpose of our scoping exercises was to:

- Review the incidence of patients with vertigo attending A&E.
- Review the pathway taken with the aim to improve care and associated healthcare costs.

Method

Data was collected for three months of A&E attendances who were diagnosed with ICD10 code – H81 (disease of the ear) (n=71). Collation included: patient sub-code, age, place of discharge, onward referrals, length of stay, and re-attendance at A&E. From this data we established a current patient pathway, and will make recommendations to improve the pathway.

Discussion/conclusion

Common themes are emerging: large numbers are diagnosed with a disorder of vestibular function, but this does not correlate to the numbers referred for rehabilitation. The majority of patients are being diagnosed with BPPV (80%) but are not being treated as recommended by *NICE Clinical Knowledge Summary* or *Clinical Practice Guidelines*.

Exercise and advice for patients newly diagnosed with Parkinson's Disease (PD)

A service improvement project

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Background

The 2017 NICE guidelines recommend early referral to physiotherapy for advice and education regarding exercise. There is preliminary evidence that exercise can increase brain-derived neurotrophic factor (BDNF) blood levels in people with PD which promotes neuroplastic changes and in turn may have a neuroprotective role (Hirsch *et al* 2018). An audit of the outpatient physiotherapy service at the National Hospital for Neurology and Neurosurgery (NHNN) identified that these recommendations were not consistently being met due to demands on the service. A service improvement project was undertaken to pilot a financially viable method of meeting this unmet need, motivating patients to be proactive in self-management of their long-term condition at diagnosis.

Method

An educational evening group was piloted to ten patients who were newly diagnosed with PD. Information regarding the benefits of early and vigorous exercise was given alongside discussion of current research papers and guidelines. Patients participated in a practical demonstration which encompassed the key principles of exercise eg whole body, powerful movements. Pre and post intervention data was collected regarding current activity levels and confidence in patient's knowledge of exercise recommendations for PD.

Results

Following the group, all patients reported a positive change in exercise participation. Results demonstrated an average of 132% increase in activity levels; progressing from an average of 75 to 174 minutes of exercise per week. Prior to the intervention only 40% of the patients rated the confidence of their knowledge as greater than 5/10, with this increasing to 100% following attending the evening.

Conclusion

Initial results suggest that this project was a successful and financially viable method of delivering specialist evidence-based education to patients with PD, empowering them to start exercising regularly and in turn modify the progression of their disease.

Enhancing inpatient stroke rehabilitation through the use of innovative voluntary and charitable approaches

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Background
There is increasing evidence that an enriched environment and increased opportunities for stimulation, interaction and task practice enhances recovery following stroke. However, in challenging financial times in the NHS we need to seek innovative ways to help achieve these aims. On our Acute Stroke Unit we have used a variety of voluntary and charitable methods to help augment the service we provide to patients.

Voluntary services include a therapy volunteer (five hours per week), a 'pets as therapy' (PAT) dog and volunteer (one hour per week) and a charitable iPod pharmacy which runs in conjunction with our neurological music therapist (funded post).

Subsidised services include a partnership with 'Stroke Odysseys', an organisation part funded by the Arts Council to provide therapeutic arts practice combining movement, music, poetry and performance (1.5 hours per week).

Aims
To present a summary of the voluntary and charitable services utilised on our stroke unit and outline the impact that these have had on the patients, families and staff on the stroke unit.

Method
Mixed methods were used to gain feedback from both service users and staff about each of the innovative approaches outlined above.

Results
Feedback from both patients and staff has been positive, and quantitative data shows enhanced activity levels and opportunities for social interaction for patients. There were high numbers of patients requesting to reattend sessions and/or continue with the activities offered. Utilising a range of approaches allows inclusion of patients with varying levels of physical, cognitive and language impairment.

Conclusion
We have demonstrated that it is feasible to use voluntary and charitable approaches to enrich the environment on our Stroke Unit, utilising both 1:1 and group settings with positive feedback gained from those involved.

An upper limb class held in a neurological rehabilitation unit
A service evaluation

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Background
Circuit class therapy (CCT) was considered to enable increased practice time without increasing staffing (De Weerdt *et al* 2001). Few published studies have investigated the content and effectiveness of upper limb classes.

Aims
To evaluate the upper limb circuit class provided in a rehabilitation unit, in terms of the physical activity level of participants, the performance of each participant and the staffing required.

Method
Four complete 60-minute classes, offered to neurological inpatients of a rehabilitation unit once weekly, were observed. And the content of each session was recorded using a behavioural mapping form comprising activity (tasks, functional activities) and inactivity (each category consisted of many subcategories for further detail). Two observers recorded the practised activities, the time spent on each activity, and the number of participants and staff at every class.

Findings
Fifteen sessions (including seven participants and nine therapy staff) were recorded over four classes. Data showed that participants spent about 55.7% of the session time on active practice and the remaining 44.3% on inactivity. The analyses of time spent on activities revealed that little time was spent on functional activities. Comparison of each participant's performance showed that the session duration and time spent on specific activities varied. The staff-to-participants ratio was over 1/3 in all classes.

Conclusions
Physical activity levels of participants in the upper limb class was lower than expected, and the dosage of the class session and some activities provided might not be optimal. The ratio of staff to participants may also need to be considered in future service delivery.

References
De Weerdt W *et al* (2001) *Group physiotherapy improves time use by patients with stroke in rehabilitation* *Australian Journal of Physiotherapy* 47 (1) 53-61.

Early rehabilitation in spinal cord injury
A service evaluation of the spinal cord injury centres in the UK and Ireland

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Introduction
Early rehabilitation for SCI patients optimises functional recovery and improves a person's quality of life. In the absence of clinical guidelines, a service evaluation was conducted to investigate the current practice across the twelve specialist spinal cord injury centres (SCICs).

Method
A purposive sample of senior physiotherapists from twelve SCICs in the UK and Ireland. The philosophy of phenomenology resides within the naturalistic paradigm and focuses on participants own perspectives to provide insight into a service. Semi-structured interviews were conducted (September and October 2019). Interviews were audio recorded and transcribed. A reflective diary was completed and member-checked. Thematic analysis involved an inductive approach, allowing themes to emerge. Providing a holistic perspective, this ensured rigour and transparency to ensure precision, consistency and extensiveness to ensure credibility.

Results
The sample consisted of twelve neurological physiotherapists, one from each SCIC. The physiotherapists were qualified for 12-38 years and had worked specifically with spinal cord injuries for between 11-36 years. The semi-structured in-depth interviews sought to investigate the current practice of the twelve SCICs to explore their provision of early rehabilitation for SCI patients. Although early rehabilitation was the main theme, through thematic analysis via a coding system five themes were identified: initial injury management, patient journey, facilities, services and financial constraints, and knowledge of framework. These themes captured a narrative response of early rehabilitation for individuals with an SCI.

Conclusions
Early rehabilitation was an important aspect of care for individuals with SCI and was practised within the UK and Ireland. This service evaluation highlighted three aspects to early rehabilitation: educational, the initial physical interventions and dynamic rehabilitation. Rehabilitation should be recognised as an intervention that occurs from day one and should be reflected across all clinical guidelines and standardised as an intervention based on the empirical phases above.

Open gym

Improving access to therapy for neurological outpatients in Plymouth

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Background

It is widely acknowledged that rehabilitation intensity is crucial in people with neurological dysfunction. Significant demands mean that service providers are required to develop innovative ways of meeting patient needs, often without additional resources. The neurorehabilitation team (NRT) in Plymouth treats patients with a variety of neurological conditions and is committed to service development. Recognition that patients would benefit from increased service efficiency and access to therapy led to the development of the 'open gym' format.

The aims of the open gym were to:

- Increase flexibility to offer appointments in a more timely manner.
- Improve joint working and reduce assessment repetition.
- Increase intensity and frequency of therapy input.
- Decreasing length of stay.
- Improve patient engagement and self-efficacy.

Method

The open gym runs for two hours, four days per week and is staffed by physiotherapists, therapy support workers and occupational therapists. Patients meeting the criteria agree their treatment programme to commence and progress with distant but not direct supervision. Number of referrals, length of stay, face-to-face contacts, staff and patient feedback were recorded between January and September 2019 and compared to previous data.

Results

Forty-eight patients (8% of the total NRT caseload) were referred. Of these, the overall length of stay reduced by 19% from 109 to 89 days. The average number of face-to-face contacts increased from five (one appointment every 25 days) to 21 (one appointment every 6.7 days). Patient and staff feedback was excellent.

Conclusion

The open gym format has enabled the NRT to meet the aims highlighted. It has improved flexibility to allow patients timely access to the gym several times per week and increased joint working. The gym provides a positive rehabilitation environment and patient self-efficacy has improved. The NRT now aims to increase referrals and impact on waiting list times.

The impact of extending the scope of practice of neuroscience physiotherapists on patient access to specialist assessment following spinal cord injury

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Introduction

Guidelines recommend that an International Standards for Neurological Classification of Spinal Cord Injury (ISNCSCI) is completed following spinal cord injury (SCI)1, including assessment of voluntary anal contraction (VAC) and deep anal pressure (DAP). Guidelines also recommend assessment for neurogenic bowel dysfunction (NBD) within 24 hours of SCI2; this involves examining the anal wink reflex. A local audit completed in a tertiary neuroscience unit in the UK found that only 16.13% (5/31) of newly SCI patients had a complete ISNCSCI, and only 12.90% (4/31) were assessed for NBD. While physiotherapists completed the majority of the ISNCSCI assessment, sacral dermatomes, VAC, DAP and anal wink assessments were completed by doctors.

Objectives

To evaluate the effect of extending physiotherapy scope of practice on ISNCSCI completion and NBD assessment in patients following SCI.

Method

A competency framework was created and implemented, enabling neuroscience physiotherapists to assess sacral dermatomes, VAC, DAP and the anal wink reflex. Following completion of the competency framework, a six-month audit of all newly SCI patients was undertaken, to assess the frequency of completion of ISNCSCI and NBD assessment.

Results

Thirty-two newly SCI patients were included in the re-audit period. There was a statistically significant increase (p= 0.007) in frequency of completion of the ISNCSCI, rising from 16.13% (5/31) to 46.88% (15/32). Completion of a NBD assessment also had a statistically significant improvement (p= 0.0006), increasing from 12.90% (4/31) to 53.13% (17/32).

Conclusions

Extending the scope of physiotherapy practice through a competency framework improves the completion of ISNCSCI and NBD assessment in newly SCI patients.

References

National Institute for Clinical Excellence (NICE) (2016) *Clinical Guideline 41, Spinal injury: assessment and management*.

Multidisciplinary Association of Spinal Cord Injured Professionals (MASCIP) (2012) *Guidelines for management of neurogenic bowel dysfunction in individuals with central neurological conditions*.

Standardising practice in the assessment of acute spinal cord injury

A review of the impact of staff specialism on compliance with local standards

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Introduction

As part of a project to improve acute spinal cord injury (SCI) rehabilitation assessment and neurogenic bladder and bowel care in a tertiary neurosciences centre, local therapy quality standards were set. These aimed to achieve 100% compliance with completion of an International Standards for Neurological Classification of Spinal Cord Injury (ISNCSCI), neurogenic bladder and bowel assessment and implementation of neurogenic bladder and bowel care. The neurosciences physiotherapy team contains both static specialist physiotherapists and rotational non-specialist physiotherapists.

Objectives

To evaluate differences in ISNCSCI and neurogenic bladder and bowel assessment completion among static specialist neuroscience physiotherapists compared to rotational non-specialist physiotherapists.

Method

A six-month audit was completed to determine compliance with local standards for the completion of the ISNCSCI, assessment of neurogenic bladder and bowel dysfunction and implementation of neurogenic bladder and bowel care in acute SCI.

Results

88.89% (8/9) patients with a documented SCI who had no ISNCSCI completed were treated by rotational non-specialist physiotherapists. 81.82% (9/11) patients who had no documented assessment of neurogenic bowel dysfunction were treated by rotational non-specialist physiotherapists. 100% (9/9) of patients who were not offered neurogenic bladder and bowel advice were treated by rotational non-specialist physiotherapists.

Conclusions

Rotational non-specialist physiotherapists working on an acute neurosciences ward require additional training and support to enable them to ensure appropriate assessment and care for patients with new SCI is offered. This training should cover:

- accurate identification of patients with SCI resulting from illness or disease.
- completion of ISNCSCI assessments.
- signs and symptoms of neurogenic bladder and bowel dysfunction.
- understanding the basics of neurogenic bladder and bowel management in SCI.
- how to refer patients to specialist services for further assessment and treatment.

Development of a standardised multidisciplinary upper limb assessment proforma to improve functional upper limb outcome measures in the acute stroke unit setting

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Introduction
75% of stroke survivors present with upper limb symptoms (Lawrence 2001). In excess of 40% of patients never recover sufficient function for activities of daily living. Current upper limb rehabilitation is limited with stroke patients only being engaged in 'activity' for 13% of the day (Bernhardt 2004) and task specific functional upper limb movements only accounting for 51% of upper limb therapy sessions (Lang 2016). Current *National Clinical Guidelines for Stroke Rehabilitation* (2016) advocate high intensity, repetitive task specific practice for patients with purposeful upper limb function, and education for those with limited movement. However, in a busy acute stroke unit setting, upper limb rehabilitation is deprioritised due to service pressures and environmental constraints.

The purpose of this study is to review whether a multidisciplinary upper limb pathway, with a standardised assessment proforma and stratified functional levels, alongside an individualised rehabilitation plan can improve upper limb outcomes.

Method
Current upper limb provision was benchmarked against other London stroke units. A standardised pathway with a multidisciplinary assessment proforma identifying an upper limb functional level, appropriate rehabilitation interventions and goals was developed. At the stage of submission, 15 patients on the local acute stroke unit were included in the study.

Results
All patients received education booklets and a multidisciplinary assessment. 80% of patients were identified with shoulder pain and were subsequently reviewed by the consultant within an average of two working days. All the patients had upper limb goals set within their admission in comparison to 60% in the four months prior to this study.

Conclusion
There were substantial improvements in functional outcome, timely pain management, education and patient satisfaction throughout patient pathway. Staff also self-reported an increase in confidence in upper limb management.

Neurosciences physiotherapy weekend working pilot

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Background
The current practice within neurosurgery and neurology within North Bristol NHS Trust is a five-day physiotherapy service. This means that patients do not receive physiotherapy input over the weekend, resulting in delayed assessments and discharges, which has an impact on inpatient flow.

Aim
The aim of this project was to review the impact that a weekend physiotherapy service has on flow in neurology and neurosurgery over a six-month period. This could provide data to support a business case for a seven-day working service.

Method
To staff a weekend physiotherapy service in neurology and neurosurgery over a six-month period (involving one qualified and one technician). Patients will be identified as suitable for the weekend service based on a set inclusion criteria. Data will be collected on a monthly basis and will be analysed and presented to the neurosurgery assistant general managers.

Preliminary results
At present, data has been collected from November 2019 and further data will be available by April 2020. Results from November 2019 show that 57 patients were seen over the first four weekends in November by the neurophysiotherapy team. Seventeen patients were discharged by physiotherapy over the five weekend days and an average of 14 new patients for the physiotherapy team on the Mondays preceding the pilot, was reduced to nine.

Preliminary conclusion
A physiotherapy weekend service in neurosurgery and neurology could improve flow by assessing and discharging patients over the weekend and shortening length of stay by providing rehabilitation at the weekend for medically fit patients. This service improvement project may support a business case going forward for seven-day working.

Do stroke patients always need stroke specialist therapy input on Early Supported Discharge (ESD) pathway?
A service evaluation

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Background
Sussex Community Foundation Trust (SCFT) provide ESD via a different model. The service is jointly commissioned from specialist neurological therapy services and a more generic responsive services providing supported discharge.

Patients are referred from local acute trusts and, using a comprehensive trusted assessor referral, patients are triaged according to clinical presentation into either:

- Neurotherapy (occupational therapy (OT), physiotherapy (PT), speech and language therapy (SLT))+/- reablement.
- Generic therapy (OT, PT) +/- reablement.
- Combination of neurotherapy and generic therapy +/- reablement.

Aim
To evaluate therapy input for patients based on clinical need.

Method
A retrospective review of 200 patient notes from 2018 was undertaken to establish therapy input, length of stay on the pathway and outcome.

Results
- **Generic therapy** (OT/PT) N=75. Length of stay 30.8 days. Change in Barthel 10 points.
- **Neurotherapy** (OT/PT/SLT) N=74. Length of stay 77.8. Change in Barthel 5 points.
- **Combination** N= 51. length of stay 77.3. Change in Barthel 15 points.

Patients in each group demonstrated an improvement in Barthel score from assessment to discharge, with the greatest change in average (15 points) seen in the group who received input from both neurological and generic therapists.

Conclusion
Generic therapy post stroke for selected patients is effective in improving physical outcome as measured by Barthel Index within a short time frame. Due to the expert neurological triage based on trusted assessor referral, this suggests that the patients with the more complex needs (based on lower initial Barthel score) were seen by neurological therapists, either wholly or in combination with generic therapy staff. This demonstrates the use of the most appropriate therapy team for patients based on clinical need which meets NICE guidelines for stroke.

References
NICE (2013) *Stroke Rehabilitation in Adults NICE guideline* CG162.

Functional Electrical Stimulation for correction of dropped foot in adults with cerebral palsy

A service evaluation

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Introduction

This is a service evaluation of ambulatory adults with cerebral palsy (CP) within the Functional Electrical Stimulation (FES) service at The National Hospital for Neurology and Neurosurgery (NHNN).

Aim

The aim is to establish whether FES is effective at improving walk speed and walking satisfaction within this population.

Method

Twenty-two patients with CP who had trialled FES were identified over a four-year period; six (27%) had incomplete data collection; four (18%) returned their devices within six weeks of commencing treatment and therefore ten were excluded from analysis. Of the twelve patients who continued beyond six weeks of FES treatment there were four women and eight men (ages 18 – 43 years, mean 36 years). Gross motor classification scale (GMFCS) levels were between 1 and 3 (level 1 n=4, level 2 n=6, level 3 n=2), diplegic CP (n=3) and hemiplegic CP (n=9). Data was compared between two time points; initial set up and three months follow-up. Outcome measures of 10m timed walk and visual analogue scale (VAS) of satisfaction of walking were used for data collection.

Results

Significant differences ($p<0.000000001$) were seen in VAS satisfaction of walking over a three-month period using wilcoxen test. Walk speeds increased in all twelve individuals (mean of 63% faster over 10m, baseline 0.699metres/second to 1.04 metres/second at three months) however this data was underpowered ($p<0.09$) as sample size was too small.

Discussion

Results indicate FES is effective at improving walking speed and could be a good alternative to the use of orthotics for the correction of dropped foot in adults with CP. A small sample size was assessed; however, the positive results demonstrate that this exploratory work indicates further quantitative and qualitative investigation is warranted.

The introduction of a hybrid nursing and occupational therapist role pilot as part of a quality improvement project to promote patient independence on an acute neurosurgery ward

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An acute neurosurgery ward carries a complex and high-risk patient caseload and can be a challenging environment to promote patient independence. Longstanding national difficulties with recruitment and retention of nursing staff working within neurosciences led to an evaluation of our current ward MDT practice.

Consultation with ward staff highlighted differences in culture and approach to patient care between professions. Common themes were identified as barriers to service delivery: the most significant being communication, training, 'teamworking' and shift patterns. All professions were invited to engage with establishing a pilot of a new hybrid nursing and OT role.

Patient feedback and nursing metrics were collected, and functional independence on the ward was audited. This highlighted that 27% of opportunities to sit patients out were missed, and that an average of 38% of patient washes could be more active.

A senior OT was recruited to a pilot role of twelve months working within the ward nursing team starting in June 2019. After a period of induction, the project group also introduced a quality improvement project around the role:

- The introduction of a daily shower rota for patients.
- A training and development programme for staff.
- The introduction of a ward patient lunch group.
- Development of a new ward information leaflet for visitors.
- Improvement of ward communication boards.
- Ward 'Champions' for pressure care, managing complex behaviour and nutrition.

Our objectives are to improve service delivery and staff retention by improving MDT working, staff engagement and staff satisfaction. We also aim to increase ward focus on promoting patient independence to improve patient experience and functional outcomes. In April 2020 the effectiveness and impact of the new role and QIP will be formally reviewed by collecting the relevant outcome measures and data to compare to the baseline audits and evaluations.

Changing Faces on the INRU

An MDT approach to facial rehabilitation

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Background

The face is the primary source of communication, emotional expression and identification in human beings. It can convey over 2,000 facial expressions which are vital for non-verbal communication and building relationships. Its additional functions include eating and drinking, managing secretions, and protecting eye health.

Historically, there has been no single profession that has led in the management of facial palsy due to its multifactorial and multifunctional nature. On the Trafford Intermediate Neuro Rehab Unit, we recognise this has led to a gap in service provision for these patients.

Aims

- To highlight the benefit of an MDT approach to management of facial rehab through a single case study.
- To demonstrate the need for a robust future MDT service for this cohort of patients.

Method

Single case study of a patient presenting with Miller-Fischer syndrome and bilateral facial nerve palsy who received coordinated multi-disciplinary facial rehabilitation during a two-month inpatient stay.

Results

- Patient discharged home without care support.
- He had basic discernible facial expressions.
- He was able to communicate intelligibly in person, on the telephone with family, friends and less familiar people; therefore he was able to return to work.
- He no longer required secretion management and was able to drink from a regular cup therefore negating nutritional tube feeding/fluids.

Conclusion

- Successful delivery of an MDT service for a facial rehab patient within inpatient neuro-rehabilitation.
- Reduction of long-term care needs/costs and improvement in patient confidence and quality of life.
- Demonstration that the appropriate clinicians and skills exist within the INRU team and that these can be utilised to deliver this service with appropriate organisation, further education and liaison with specialist services such as the Eye Hospital and Facial Function Clinic.
- Next steps: To establish a sustainable MDT facial rehab service with the available resources, clinicians and skills within the Intermediate Neuro-Rehab Unit.

Physiotherapy intervention following lumbar microsurgery

A service development project

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Background and initial research

At North Bristol NHS Trust, patients admitted for elective lumbar microsurgeries were routinely assessed by a physiotherapist prior to discharge. Many of these operations occur out of hours, resulting in patients either being admitted in order to receive a physiotherapy assessment or discharged without the appropriate follow-up. This has had an impact on flow and patient experience.

Aims

- To review the literature surrounding post-operative physiotherapy management.
- To adapt the service to be more evidence based and improve patient flow.

Method

The physiotherapy team reviewed the literature surrounding post-operative physiotherapy interventions in order to benchmark our service against current research.

The outcome of the literature search identified that there was no clear evidence for immediate post-operative physiotherapy; however, physiotherapy follow-up at 4-6/52 is beneficial.

A pathway was created for patients whereby advanced nurse practitioners will deliver education, both verbally and via leaflet and only refer to physiotherapy for specific needs. Physiotherapists now have access to a surgery list and can refer all patients to musculoskeletal (MSK) outpatient physiotherapy as per the evidence.

To ensure that the changes were not negatively affecting patient experience, we created a questionnaire to capture patient feedback at their first MSK outpatient appointment.

Results

Fourteen questionnaires collected over a six-month period (small response, as most patients out of area).

100% of patients that did not see a physiotherapist prior to discharge were happy with the information provided and reported a positive experience.

Conclusion

Following a review of the evidence base, elective patients undergoing lumbar microsurgeries no longer receive physiotherapy input before hospital discharge from North Bristol NHS Trust.

This has improved flow as non-complex patients no longer have to wait for an inpatient physiotherapy assessment. This has not shown any adverse effects to patient experience.

Implementation of a new goal-planning process on an intermediate neurorehabilitation unit

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Background

It was recognised the INRU had a length of stay above the national average of 80 days. Goal planning is recognised as an integral part of neuro-rehabilitation with multiple guidelines recommending its implementation due to its impact on outcomes. A new multidisciplinary goal planning process was implemented to reduce length of stay to the national average and reduce waiting times to one week. The impact on the FIM/FAM outcome measure was monitored to ensure no adverse effects on patient outcomes as a result of implementing the process.

Methods

The new goal planning process was determined through liaison with the MDT. Regular meetings maintained communication and information sharing to determine the most appropriate process and ensure effective and efficient implementation. The process involved creation of new documentation, changes to meeting frequency, format, timings and staff representation at these meetings. SWOT and team roles analysis were completed ensuring active engagement from the MDT to ensure success, effectiveness and smooth integration of the new process whilst taking into account individual and team traits. Regular and consistent communication ensured the process was effectively implemented into practice and ensured staff felt valued and engaged in the change process.

Results

Following the implementation of this goal planning process, length of stay reduced to 75 days with patients waiting an average of ten days to be admitted to the unit. Delayed discharges reduced to 30 days and the overall number of patient episodes on the unit increased by 51% per year. This demonstrates the importance of forward planning and good communication when implementing a new process and the value a robust goal planning process can have on the efficiency and effectiveness of an INRU.

Conclusion

This new process enabled a coordinated approach to rehabilitation maximising the unit's effectiveness and efficiency and patient and family/carer satisfaction.

Evaluation of the PD Warrior programme in a clinical setting in the UK

Service evaluation using service user questionnaire

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Background

Studies describing the evidence supporting neuro-protection in patients with Parkinson's Disease (PD) by forced use amplitude based exercise have facilitated high intensity exercise programmes such as PD Warrior (PDW). PDW has been supported in the 'Parkinson's Exercise framework' by Parkinson's UK. Currently 22 UK licensees deliver PDW. Some have seen up to 82 people complete 'the 10 week challenge'.

We are presenting a service evaluation of 'PDW South East Wales'.

Methods

Following discussion with PDW accredited trainers, a questionnaire was developed. To reduce the need for handwriting, given PD associated difficulties with dexterity, online multiple-choice format was used. Service users willing to be contacted were sent the questionnaire. Descriptive statistics were used to evaluate the 25 responses from 54 questionnaires sent.

Results

33% had started PDW in the last twelve months and 12% indicated to be completing 'the 10-week-challenge'. 52% indicated to have a personal exercise plan. 33% indicated to exercise every day, 17% every other day and 25% only when in classes. The online PDW exercise support platform was used by 12% and 100% felt PDW was making a positive difference to their lives. Most (72%) reported to be able to move better after exercise and 64% felt more active. 56% indicated exercise gave them more energy and power. When asked about the benefit of attending classes, 88% reported to work harder and 84% liked the social interaction.

Discussion

Results are positive but also show areas for service improvement, since only 52% of respondents were aware of their personal exercise plan despite it being an integral part of PDW. Poor memory as an aspect of PD may contribute to low exercise plan recognition, highlighting further need to educate and reinforce daily exercise routines. Generally, this evaluation shows that frequency is the hardest PDW core principle to achieve.

Student projects

Incidence and risk factors for patellofemoral dislocation in people with Charcot-Marie-Tooth disease (CMT)

Enza Leone[1], Sally Davenport[1], Claire Robertson[2], Matilde Laurà[3], Gita Ramdharry[3]

Background
Patellofemoral dislocation is commonly encountered in clinical practice among people living with Charcot-Marie-Tooth disease (CMT). To date, no studies have investigated the frequency and risk factors for patellofemoral dislocation in adults with CMT.

Methods
A cross-sectional, observational study was conducted in a cohort of people with different subtypes of CMT. Adults with CMT attending their outpatient clinics at a specialist neuromuscular centre in the United Kingdom were invited to undergo a patellofemoral evaluation in addition to their routine clinical assessment. A physical examination of the knee joint was conducted and a series of questions regarding the history of any patellofemoral dislocation were asked.

Results
Among 31 individuals with CMT, the incidence of patellofemoral dislocation was 32.3%. Patellar dislocation was associated with a CMT-1A sub-type (p=0.013) and younger age at disease onset (p=0.004). Patella alta (OR, 9.0, 95% CI: 2.4 – 34.0; p=0.001), J-sign (OR, 5.4, 95% CI: 1.3 – 21.7; p=0.017), lateral patellar glide (OR, 17.3, 95% CI: 2.1 – 142.8; p=0.001), generalised joint hypermobility (OR, 8.3, 95% CI: 1.6 – 42.1; p=0.012) and knee flexor muscle weakness (p=0.012) were all associated with an increased risk of patellofemoral dislocation. A pronated foot posture was associated with a weak but not-significant increase in risk of patellar dislocation (p=0.163). Patella alta and age of onset were also independent predictors of patellofemoral dislocation (p=0.028 and p=0.024, respectively).

Conclusion
Patellar dislocation was common in this cohort of adults with CMT and was associated with multiple risk factors. The identified predisposing characteristics may be addressed by clinicians through preventive, supportive and corrective measures. A large prospective observational study is needed to confirm the results of this study.

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An investigation into the predictive ability of clinical outcome measures on functional outcome after inpatient stroke rehabilitation in different severities of ischemic and haemorrhagic stroke

Wing Tai Lau[1], Adine Adonis[2], Sally Davenport[3]

Background
In stroke rehabilitation, accurate prediction of functional outcome is crucial to guide goals setting and discharge planning. Knowledge of the predictive ability of clinical outcome measures (OM) enhances clinical decision-making. This study aimed to investigate whether specific OMs are predictive of functional outcome, in different severities of ischemic and haemorrhagic stroke.

Methods
A retrospective study was undertaken in a rehabilitation centre, Singapore. 337 people with stroke, admitted between January and December 2018, were assessed a range of OMs, including the Fugl-Meyer upper extremity assessment (FM-UE), the Fugl-Meyer lower extremity assessment (FM-LE), the Trunk impairment scale (TIS) and the Montreal cognitive assessment (MoCA). Functional outcome was measured through the Functional independence measure (FIM), and discharge location was recorded. Regression analysis determined the predictive values of clinical OMs on functional outcome, and discharge location.

Results
In people with ischemic stroke, the FM-LE (ß=0.75 p<0.001, 95% CI (0.45, 1.04)), the MoCA (ß=1.23 p<0.001, 95% CI (1.0, 1.45)) and the TIS (ß=1.23 p<0.001, 95% CI (1.0, 1.45)) were predictive of functional outcome. In people with haemorrhagic stroke, the MoCA (ß=0.57 p=0.01, 95% CI (0.14, 1.01)) and the TIS (ß=1.32 p=0.02, 95% CI (0.52, 2.12)) were predictive of functional outcome. The most consistent OM that predicted functional outcome in different severities of ischemic and haemorrhagic stroke was the MoCA and the TIS, respectively. The FM-UE was predictive of home discharge in people with ischemic stroke (OR 0.96 p=0.02, 95% CI (0.93, 0.99)).

Conclusion
The predictive information of OMs investigated within this study suggested the importance of cognition and trunk function on functional outcome post-stroke. Future studies are required to validate the predictive values in a large, prospective stroke cohort.

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Teaching outside the (board game) box: developing a board game to reduce the risk of neurophobia in physiotherapy students

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Introduction
Neurophobia is the fear that university students have of neuroscience, which then negatively impacts on learning. Neurophobia is an international issue affecting physiotherapy students as well as medical students. Research has shown that students' examination scores increase when using active learning methods compared to traditional lectures and that active learning techniques such as playing board games and using modelling play can improve learning and reduce neurophobia. Creative teaching methods are also being encouraged as an alternative to death by slide presentations. Therefore, the author developed a board game for physiotherapy students to aid the teaching and learning of neuroanatomy and neuroscience.

Methodology
The board game has been developed using a series of PDSA (Plan, Do, Study, Act) cycles in which the prototype was evaluated using feedback from students who tested the first iteration of the game. The rules of the game were then amended slightly in response to the feedback. The second iteration will then be played with a second group of students, who will evaluate the game. A third PDSA cycle will then by undertaken within which physiotherapy students will be surveyed for feedback on playing the game and whether this method of teaching and learning was preferred to traditional lectures.

Results
It is hypothesised that playing the board game reduces the risk of neurophobia and increases student learning of neuroanatomy through the use of active learning to promote constructivism.

Evaluation
The Kirkpatrick Model will be utilised to analyse and evaluate the results of the survey and ascertain whether playing the board game has aided learning of neuroanatomy and reduced neurophobia.

Combined effects of neurodynamics and lumbar traction on sciatica due to degenerative disc disease

Priyanka Gorukanti[1,2], Naveen Kumar Balne[2]

Objective
To facilitate disc decompression on the sciatic nerve by using traction, and to evaluate the effect on neural mobility by neurodynamics and its effect on functional outcome, pain and ADLs.

Methods
Forty patients with sciatica due to degenerative disc disease with age >25 years were randomly allocated into three groups by lottery method.

- **Group 1**: age matched control
- **Group 2**: neurodynamic
- **Group 3**: lumbar traction
- **Group 4**: neurodynamics and lumbar traction.

Efficacy of treatment was assessed by Visual Analogue Scale (VAS), goniometer, Sciatica Bothersomeness Index (SBI), Maine Seattle Back Questionnaire (MSBQ) and Hopkins Symptom Checklist 25 (HSCL-25); MRI data was collected. Within each group, results were analysed by the Wilcoxon signed ranks test for VAS, paired tests for goniometer, SBI, MSBQ, HSCL-25 and paired sample statistics for MRI. Between groups comparisons were made by using the Kruskal Wallis test for VAS and the one-way ANOVA for goniometer, SBI, MSBQ, HSCL-25 and MRI.

Results
Groups 3 and 4 showed equal improvement in MRI outcome. Group 4 showed improvements in pain, functional outcome, activities of daily living, anxiety and emotional distress.

Conclusion
Mean values showed significant improvement in the combined effects of neurodynamics and lumbar traction when compared to neurodynamics and lumbar traction alone.

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How can the use of Lycra garments influence occupational engagement for children with cerebral palsy?

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It is estimated that 1 in 400 babies in the UK are born with a type of CP – including quadriplegic, hemiplegic or diplegic – with as many as 1,800 new cases of children with CP diagnosed each year (cerebralpalsy.org.uk 2019). A common feature of CP is associated muscle weakness of the neck, trunk, shoulder and pelvis, all of which contribute to poor posture and positioning impairment. Research suggests postural instability can lead to fatigue and reduced occupational engagement (Alagesan and Shetty 2011).

The National Institute for Health and Care Excellence (NICE) 2016 guidelines for the management of spasticity associated with CP state that orthoses should be considered for children and young people based on their individual needs.

Lycra Garments (LGs), otherwise known as dynamic pressure orthoses, are made-to-measure orthotic devices that use sections of Lycra, positioned strategically to reinforce panels in specific areas, to aid corrective alignment of the body. LGs can assist with alignment, biomechanics and neuromuscular activities as well as increasing a child's sensory and proprioceptive awareness during use (Romeo *et al* 2018, Elliott *et al* 2011, Flanagan *et al* 2009). However, LGs are not recognised as orthoses, due to limited evidence of their effectiveness. NICE consider LGs to be alternative or complimentary treatment and therefore funding is not routinely commissioned creating inequality within posture management for children with CP and other neurological conditions.

This literature review examines how the use of LGs can influence occupational engagement for children with CP. It identifies six themes that include increased motor function, improved posture management and balance, increased sensory awareness, changes in affective state, improved energy levels and difficulties in garment management. It identifies the need for further clinical research into the effectiveness of LGs and the need for LGs to be formally recognised as orthoses by NICE.

An exploration of current mobilisation practice on Austrian hyperacute stroke units

An online survey

Andrea Stockreiter[1], Adine Adonis[2], Stefan Tino Kulnik[3], Sally Davenport[1]

Background

Mobilisation is a complex intervention delivered by a multidisciplinary team. Current Austrian stroke-care guidelines do not recommend mobilisation within 24-hour post stroke onset for every patient due to potential harms. This research explored the current reported mobilisation practice of physiotherapists, occupational therapists, doctors and nurses on hyperacute stroke units (HASUs) in Austria with special interest in associated harms of mobilisation within 24-hour post onset and perceived contraindications to first mobilisation.

Methods

An online survey was designed and piloted before distribution to all 39 Austrian HASUs by the chair of the Austrian Stroke Association. Data was collected between June and July 2019. Descriptive and inferential statistical tests were used for comparison between groups of respondents. Ethical approval was granted by UCL Research Ethics Committee.

Results

The survey was completed by 128 healthcare professionals. One hundred and six questionnaires from 18 different HASUs with >60% completion were included in analysis. Thirty-two physiotherapists (30.2%), 17 occupational therapists (16%), 32 nurses (30.2%) and 25 doctors (23.6%) participated. Sixty-five respondents (64.4%, n=101) thought that nurses were mainly responsible for mobilisation, whilst 74 (69.8%, n=106) reported that doctors decided when patients should first be mobilised. Forty per cent of doctors (n=10) did not associate any harms with mobilisation within 24h. Bleeding (37.5%, n=12) was the main concern mentioned by nurses and therapists mainly worried about overexerting patients (20.4%, n=10). Significant interprofessional differences ($p<0.05$) were found for the following contraindications to first mobilisation after ischemic stroke: patient does not follow verbal commands, palliative care, blood pressure >220 bpm, blood pressure >180 bpm, chest infection, dizziness, puncture of femoral artery.

Conclusion

Discrepancies appear to exist between therapists, nurses and doctors about associated harms of mobilisation within 24-hours post stroke and perceived contraindications to first mobilisation. Addressing these differences to support multidisciplinary teamwork will help facilitate the delivery of best practice care on Austrian HASUs.

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The prevalence, nature and predictors of falls in people with Parkinson's Disease after deep brain stimulation

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Background

Falls are common amongst people with Parkinson's disease (PwP). Deep brain stimulation (DBS) is an established treatment for tremor and rigidity, but its effect on postural instability and falls is less clear. Whilst within the literature the prevalence of falls after DBS has been outlined, the nature and predictors of these falls are unknown. This work aimed to explore falls experienced by PwP who had undergone DBS between one to four years previously.

Methods

Questionnaires including the Gait and Falls Questionnaire (GFQ), a falls diary, the Falls Efficacy Scale-International (FES-I) and a self-report information sheet were sent to 132 PwP. Eighteen PwP who attended clinic between April and July 2019 and reported to be falling on the GFQ were assessed objectively using the Mini-Balance Evaluation Systems Test (Mini-BESTest).

Results

A 64.4% response rate was obtained, of whom 65.9% reported falls. These were mostly attributed to 'loss of balance'. Worse balance measured by the Mini-BESTest was not significantly correlated with worse gait and falls recorded from GFQs ($p=0.06$). It was, however, significantly correlated with increased fear of falling on the FES-I ($p<0.001$) which was also a predictor of future falls ($p=0.005$). Other significant fall predictors, investigated through logistic regression analysis, included previous falls ($p=0.007$), lower preoperative Unified Parkinson's Disease Rating Scale motor subsection (UPDRS-III) scores on medication ($p=0.005$) and self-reported altered sensation ($p=0.008$).

Conclusions

This study indicates that postural instability and falls remain ongoing features following DBS. This outlines the need for further management within this population, as falls experienced are similar in nature and prediction to those experienced by the wider PD population. The significant relationship between lower preoperative UPDRS-III scores on medication and subsequent falls is surprising and requires further study to elucidate whether this is real or may be due to unrecognised sources of bias or confounding.

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Fall definitions, faller classifications and outcomes used in falls research among people with multiple sclerosis

A systematic review

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Background

Due to the many negative consequences associated with falls among people with multiple sclerosis (MS), research in this area is becoming increasingly prevalent. However, the variation in definitions and outcomes used in this field is preventing the progression of research. To standardise these research procedures, it is first necessary to identify what methods are currently being used.

Aim

To quantify the variation in definitions of a fall, faller classifications and falls outcomes used in prospectively recorded falls-related literature among people with MS.

Methods

A systematic review of peer-reviewed journal articles was conducted using electronic databases and through hand-searching the reference lists of relevant studies. Inclusion criteria were participants with a diagnosis of MS and any study design in which falls data were prospectively recorded using written records. One reviewer extracted the relevant data. The extracted data were then verified by a second reviewer.

Results

Twenty-six papers met the inclusion criteria. Thirteen different fall definitions were identified. Of the papers reporting percentage of fallers as an outcome, the majority (n=17) classified an individual as a faller if they fell at least once, while in two studies an individual was required to have two or more falls. Fourteen different falls outcomes were used across the included studies, with percentage of fallers and total number of falls reported most frequently.

Conclusions

This review highlights the large variation in fall definitions, faller classifications and falls outcomes used in falls research among people with MS. This hinders cross-comparison and pooling of data, thereby preventing researchers and clinicians from drawing conclusive findings from the research. It is recommended that the patient perspective and researcher consensus is obtained to create an international standard for the definition of a fall, classification of a faller, and outcomes to be used in falls research for people with MS.

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Functional Electrical Stimulation (FES) for foot drop in neurological rehabilitation

A survey of UK physiotherapy practice

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Introduction

Functional Electrical Stimulation (FES) is widely researched and is considered an effective treatment option for neurological patients with foot drop. There is currently no published literature discussing the physiotherapy pattern of FES use within the UK. The aim of this study was to investigate UK physiotherapy clinician's use, knowledge of evidence, training using FES for foot drop as well as referral and prescription criteria and barriers and facilitators of use.

Methods

A descriptive enquiry was undertaken using a survey tool adapted to address the aims and objectives of the study. The electronic survey was distributed to physiotherapists working throughout the UK. Primary survey response analysis was completed using JISC Online Surveys with further analysis using Microsoft Excel and SPSS (IBM SPSS Statistics 25). Ethical approval was gained for the study from the School of Health Sciences Research Review Group (SHS/18/13).

Results

A total of 217 questionnaire responses were included in the final survey analysis spanning the UK. Most respondents had worked with neurological patients for greater than ten years (65.4%). Nearly half of NHS staff (47.8%) reported they never or rarely use FES, with the majority of private practitioners using it frequently or sometimes. A limited number (29%) reported having specific referral or prescription criteria for FES. Barriers to using FES included high costs and funding issues, no access or limited access to equipment as well as lack of training, knowledge and experience.

Conclusions

There is insufficient use of FES for foot drop in the UK particularly within the NHS. Physiotherapists are keen to use FES more in patients with foot drop despite reduced awareness of the strength of evidence supporting its use. There is currently insufficient clear referral and prescription criteria available. Improved access to resources, education and funding may assist future implementation. Future research should focus on barriers to use.

Student experiences of neurological physiotherapy

Gary Morris[1,2], Rebecca Jones[1,3], Phedre Nicholson[1,4]

Background

Student experience during training can influence levels of interest in a speciality and affect career choices after graduation. Despite neurological physiotherapy being considered a significant area of practice within the profession there is a paucity of evidence exploring students' experiences of the speciality.

Exploration of student experiences of cardio-respiratory physiotherapy has highlighted that those who had negative or unsatisfactory experiences felt a lack of preparedness for practice and perceived themselves as less competent as a result. This has been linked to recruitment and retention issues and lack of interest in cardio-respiratory physiotherapy.

Among medical students a phenomenon of 'neurophobia' has been found, which is a perceived fear of the neurology speciality due to an inability to apply knowledge of basic neurology to clinical situations. This has resulted in beliefs that neurology is a complex and difficult area and only for the 'very intelligent', leading to avoidance of the speciality.

The aim of this study was to explore final year physiotherapy students' experiences of neurological physiotherapy during training and how it may impact their future practice.

Methods

A qualitative design using individual semi-structure interviews was used. A purposive sample of seven final year BSc physiotherapy students were recruited from Cardiff University, School of Healthcare Sciences. Data was analysed using thematic analysis.

Results

Three overarching themes arose around 'university-based learning', 'placement learning' and 'future practice'. Key sub-themes influencing experience were 'case-based education', 'exposure' to the speciality, and the 'clinical educator'. Regarding future practice participants noted the speciality as 'challenging' and 'interesting' which were drivers to potential specialisation in future.

Conclusions

Several modifiable factors influenced students' experiences of neurological physiotherapy in both the higher education and placement settings. Consideration of these factors by universities and clinically based education providers could further enhance experience potentially increasing interest and specialisation in neurological physiotherapy.

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The effects of Bollywood dance on the quality of life for people with dementia

A case-series study

Smriti Kumar[1], Callam Hodges-Gray[1], Praveen Kumar[2]

Introduction

There are currently around 850,000 people with dementia in the UK and this is projected to rise to 1.6 million by 2040. People with dementia generally live in a care home and this can have a negative impact on their quality of lives. Non-pharmacological interventions such as yoga, exercises and music therapy have been shown to be beneficial in improving quality of life. The purpose of this study was to test the effects Bollywood dance has on the quality of life (QoL) for people with dementia living in a care home.

Method

Five female residents (mean age 80±3 years) with dementia living in a care home were involved in the study. Residents were receiving other activities including art and reading a few times a week. In addition, they received group sessions (45 minutes) every week for six weeks of Bollywood dance by a student volunteer. The primary outcome was Dementia QoL questionnaire that was administered at the start and end of the programme.The questionnaire includes questions about participant's feelings, memory and overall QoL.

Results

At six weeks, three participants indicated they were more cheerful, less irritable, felt full of energy, lively and had an increased level of confidence. For memory related questions, three participants were not at all worried about forgetting things, were remembering people better and felt better about themselves. Two participants were able to remember the day better. Response to the question on the overall quality of life indicated that for four this remained the same but only one participant showed improvement.

Conclusion

This case series study provides low level evidence on the effects of Bollywood dance in people with dementia. Additional, higher-level studies are required to further support its use.

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The effectiveness of a cue intervention, using an activity watch, to increase habitual physical activity levels in ambulatory individuals with chronic stroke

A feasibility study

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Background
Physical inactivity is the second highest risk factor for stroke. Continuity of care and resources following stroke discharge from hospital are poor. Survivors report that education, professional input and technology could help to improve physical activity (PA) levels. Limited research has investigated interventions to improve PA levels in chronic stroke.

Purpose
To evaluate the feasibility and effectiveness of a cue intervention, to increase daily PA levels in individuals with ambulatory chronic stroke.

Methods
Single-group, ABA design intervention study; with 1-week baseline, 1-week intervention and 1-week withdrawal and follow-up. Individuals (N=4) with chronic stroke, recruited from stroke support groups. Intervention: A wrist-worn watch with cues, reminding to become physically active following 55 minutes of physical inactivity, with an education session on PA. Outcome measures: Feasibility: retention rates, satisfaction and compliance with the intervention; PA: total PA, standing and stepping time, step count and sit-to-stand transitions.

Results
Of the eligible participants, four (44.4%; time since stroke 57±47.1 months) were enrolled and 100% completed the duration of the study. Seventy-five per cent were satisfied with the cue and 75% rated the educational resources excellent. Daily PA time increased by 35.5±30.6 minutes from baseline to intervention, and 30.0±40.1 minutes from baseline to withdrawal. There were low-to-moderate changes in overall percentage change from baseline to intervention in step count and stepping time (36% and 22%, respectively), and moderate changes in step count with those using a walking stick (50%). All PA measures remained elevated above baseline measures at the withdrawal phase.

Conclusions
The cue intervention was acceptable to individuals with ambulatory chronic stroke, with full retention of participants for the duration of the study providing motivation for most participants to improve PA levels. Cue interventions should be further investigated as a self-management tool, to improve PA levels in those with chronic stroke.

The Innowalk Pro assisted movement device as an intervention for rehabilitation following acquired brain injury

An observational case study

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Background
Early ambulation following stroke is recommended in the NICE guidelines. Repetitive functional movements encourage brain reorganisation and the re-establishment of movement patterns.

The Innowalk Pro facilitates cycling movements of the lower limbs at variable speeds in a supported seated or standing position. The movements can be fully facilitated or the patient can participate in the cycling motion when able. This provides a graded approach which allows the machine to be used for patients of differing ability whilst also allowing for recovery.

Aims
To explore the feasibility, safety and acceptability of the Innowalk Pro within the rehabilitation programme of a 13-year-old boy with a severe traumatic brain injury.

Method
Informed consent was obtained from family. The Innowalk Pro was used as an adjunct to the patient's daily rehabilitation programme for a period of two months and we were able to achieve top speed in a vertical position for 25 minutes.

Results
The Innowalk Pro was well tolerated by the patient with no safety concerns. The therapists noted an increase in right lower limb automatic movements enabling the use of the static bike with assistance. He also achieved his target of completing the 50 metre GNR walking with assistance of two therapists.

Conclusion
The Innowalk Pro is a feasible, enjoyable and exciting intervention in the early rehabilitation of a paediatric patient with acquired brain injury within the acute hospital setting.

Further research is required to support these findings.We intend to develop an appropriate objective outcome measure and also conduct satisfaction surveys to evaluate the use of the Innowalk Pro.

Effect of mental subtraction on the performance of a squat vertical jump

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Background
Several studies suggested that arithmetical abilities may be grounded in sensorimotor experience. While several experimental results showed a possible influence of motion on numerical cognition, the reverse effect has been less studied.

Aim
In this study two types of stimuli of mental subtraction (MS) were used to examine their respective influence on the performance of a squat vertical jump (SVJ).

Methods
Overall, 101 undergraduate male subjects participated to the study. Among them, 80 subjects performed SVJs after: (a) the reading out loud of the action verb 'jump', (b) that of a number and (c) a mental subtraction. In Group 1 (40 subjects) the used numbers were written with Arabic digits and, in Group 2 (40 subjects), with words. Group 3 (21 subjects) performed SVJs without any backward cognitive stimulus. Jump height was measured by an Optojump-next® apparatus.

Results
The results showed an influence on SVJ height of both the action verb 'jump' and mental subtraction, this latter influence being only observed when the numbers were written with Arabic digits.

Conclusion
Mathematical representations may be rooted in bodily movements that have been previously experienced and/or that numerical cognition and movement preparation may share similar cerebral mechanisms. Our results can open a window implementing these cognitive stimuli and the aspect of bodily experiences and numerical cognition in everyday practice of neurological physical therapy.

All day, every day, the rehab way

Integrated ward project at Princess Royal Spinal Injuries Centre

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Background
In 2018, there was a trust-wide initiative at Sheffield Teaching Hospitals NHS Foundation Trust to explore integrated ward projects across different specialities. One of the drivers for this initiative at our centre was the higher than usual nursing staff shortages due to vacancies, maternity leave and long-term sickness.

The integrated ward physiotherapist commenced in January 2019 and the occupational therapist in March 2019.

Aim
The project's aim was to explore the role of an integrated ward therapist, establish the therapist's scope of practice and highlight opportunities for learning by mapping out shared skills and profession specific tasks.

Method
Pre-implementation questionnaires were completed in November 2018 to determine therapy and nursing staff interpretation of effective communication and perception of integrated working. Patient questionnaires were completed in regards to their perception on the number of hours they engaged in rehabilitation activities. Observational shifts were also undertaken prior to implementation to identify the areas of need within the service and to begin to outline the role of the integrated ward therapist.

Four months into the project, patient and staff questionnaires were repeated to measure any changes.

Results
Both therapy and nursing staff reported improved communication and integration between the professional groups.

Patients who reported that they felt they engaged in more than eleven hours of rehabilitation activities per week increased by 20%. No patients felt that they received less than six hours of rehabilitation activities per week at the four-month review compared to 20% at pre-implementation.

Conclusions
Due to positive outcomes in the first year, the project has been extended until November 2020 to explore long-term models of integrated working and continue to foster a therapeutic culture on all wards at the centre.

A bio-mechanical approach to gait training following stroke and the impact on motor learning

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Aim
To consider the benefits of biomechanical alignment on gait training following stroke.

Method
The biomechanical demands on the neuromuscular system required to induce the appropriate response and the impact on motor learning were researched in the literature along with the potential to impact on motor learning and how this could be practically implemented in a gait training programme.

Results
There are clear biomechanical demands within the literature in the form of ground reaction force vectors (GRFV) which correlate to the response of the neuromuscular system in the form of electromyography (emg) studies. These biomechanical demands can be manipulated within a clinical setting by use of an appropriately designed ankle foot orthosis (AFOs) according to the literature.

Conclusion
Learning of any kind is dependent on having the appropriate demands on a system. Learning is reinforced by repeatable, consistent and frequent appropriate demands. The biggest demands on our lower limbs is gravity and ground reaction force. Ground reaction force generates moments about our weight-bearing joints to which our neuro-muscular system must react to provide the accelerations, decelerations and stabilisation required to produce the smooth and stable pattern we know as gait. This paper brings together the findings of our most popular publications in gait to explain the importance of alignment in order to elicit a more normal response.

Optimising physical and cognitive health in patients with Alzheimer's Disease

Ahmad Rifai Sarraj
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Background
Experimental evidence suggested that brain health is positively influenced by moderate-to-vigorous physical activity that is regularly performed. Physical activity enhances several components of cognition, including executive function (organising daily activities, planning for the future, and self-regulation of impulsive behaviour and sensation seeking), memory, treatment speed and attention. These performance improvements are corroborated by evidence from neuroimaging techniques demonstrating parallel changes in brain structure and function.

Aim
Promote and give more attention to physical activities related to cognitive health. In addition, dose-response and lasting effects of physical activity programmes will be discussed in order to identify the optimal programmes that maximally take advantage of the neuroplastic properties of the human brain even in late stages of the disease.

Methods
We performed a search of MEDLINE, PubMed (publisher-supplied), PsycINFO, and the Cochrane Central Register of Controlled Trials for studies published from 2010 to 2020. Studies included in previous reviews, related to the topic, were re-evaluated for potential inclusion.

Results
A total of 6,734 records have been screened. Intervention groups showed a statistically significant improvement in cognition of included subjects measured by the MMSE score compared to the control groups.

Conclusion
Evidence from the literature suggests that adapted and specific physical activity programmes can affect positively cognitive abilities in older adults but also in Alzheimer's Disease. Neurophysiotherapists must be educated about physical activity programmes that can yield multiple cognitive benefits in older adults or Alzheimer's Disease individuals. Health professionals must understand that older adults and individuals with Alzheimer's Disease must be aware of the plastic properties of their brain, the potential to maintain/improve their cognitive functioning and the importance to engage in mentally challenging physical activity.

Collaborative MDT working

Influencing the 24-hour approach on the INRU

Susan Bannister, Amy Boyer
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Background

To enable effective outcomes neurological rehabilitation must be a 24-hour process, with agreed goals and activities, which can be continued outside of therapy hours by the MDT. This 24-hour approach to rehabilitation is vital to enable therapeutic carryover and goal achievement. There should be clearly defined systems for ensuring co-ordination of interventions between the different disciplines.

Historically, therapy time on the intermediate neuro-rehab unit (INRU) is timetabled and intervention takes place off the ward in therapy spaces. This structured plan does not recognise other rehabilitation opportunities within daily functional activities, often delivered by the nursing team, that are integral to patients' rehabilitation.

Aim

- Increase 24-hour collaborative working, skill-sharing and problem-solving across the MDT.
- Provide increased opportunity to informal training allowing skills gained formally to be transferred into clinical practice.

Method

Unscheduled physiotherapy time was introduced one morning a week as a pilot on the INRU for six months. This time enabled physiotherapy staff to be present and more visible on the ward, assisting transferring patients, positioning patients in the bed and chair and carrying out functional mobility practice, ensuring these activities were integrated into patients' daily routine in conjunction with nursing staff.

Results

Feedback from staff was collated through a questionnaire. Responses demonstrated unscheduled therapy time increased collaborative working, improved working relationships across nursing and therapy teams, and increased staff confidence in handling and positioning patients and utilising more specialised equipment.

Conclusion

The implementation of unscheduled physiotherapy time appears to be a simple but effective addition to therapeutic activities on the ward promoting a more effective and efficient 24-hour rehabilitation approach. This project has facilitated upskilling of staff, increased the consistency of 24-hour rehabilitation and enabled staff and patients to recognise the therapeutic opportunities in normal daily routines.

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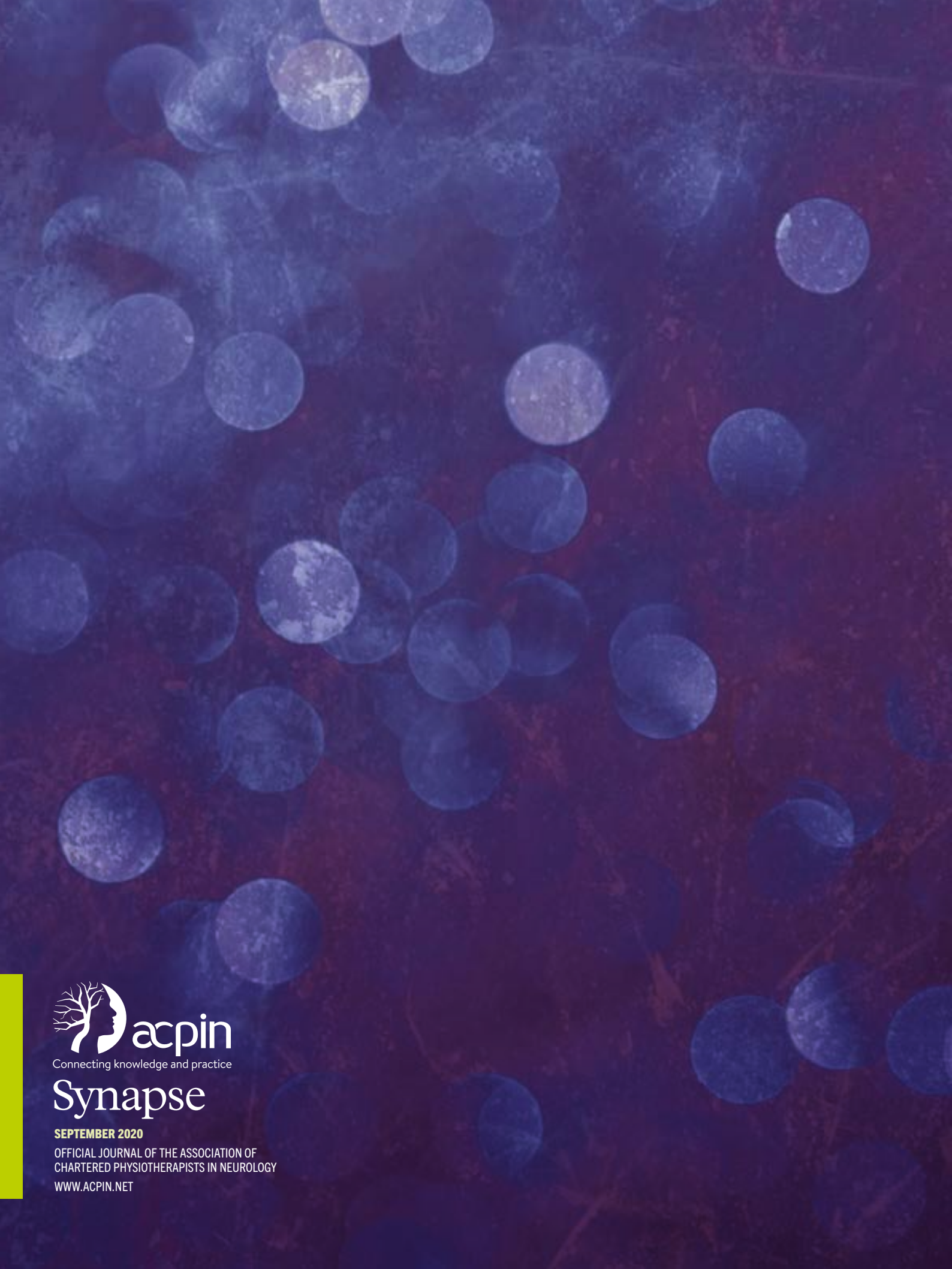

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